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ABSTRACT

Conventional accounting systems provide no indication as to what conditions and events lead to reported outcomes, since they traditionally do not include measurements of the human organization and its relationship to events at the outcome stage. Human resources accounting is used to measure these additional types of data. This research is concerned with developing and refining a methodology for human resources accounting of a present value type; that is, estimating the future productive potential of current human resources. A previous analysis of five organizational data sets addressed the issues of internal consistency of the key survey indexes; the length of performance periods and the internal consistency for multi-month periods; and the size of zero-order survey-to-performance correlation coefficients by site. In this report, results of these basis analyses are described for a sixth organization. The Survey of Organizations was the measure of organizational functioning; total variable expense and absenteeism rate were the performance measures. These measures were found to be sufficiently reliable for use in further analysis, and the relationships of survey to performance data were generally statistically significant. (BW)

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This report describes analyses preparatory to construction of a suitable file for generating a system of future performance trend indicators. Such a system falls into the category of a current value approach to human resources accounting. It requires that there be a substantial body of data which:
(1) uses the work group or unit, not the individual, as the analysis unit,
(2) contains standard measures of the human organization and dollar-convertible

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performance measures, both with high internal consistency; and (3) displays a high frequency of statistically significant relationships of human organization to performance measures.

The present report describes analyses pertaining to the requirements listed above which were conducted on data from three plants of a multi-location manufacturing organization. Internal consistency reliabilities of both human organization (survey) data and performance (total variable expenses and absence rate) were shown to be high, and a pattern of human organization-to-performance correlations resulted which are quite useable. With this organization's data, we now have a base of five organizational data sets from which we should be able to take the next steps: multiple regression, time lag and magnitude estimation, and value attribution.

TECHNICAL REPORT

October, 1976

FUTURE PERFORMANCE TREND INDICATORS: A CURRENT VALUE APPROACH TO HUMAN RESOURCES ACCOUNTING

REPORT II

INTERNAL CONSISTENCIES AND RELATIONSHIPS TO PERFORMANCE IN ORGANIZATION VI

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FUTURE PERFORMANCE TREND INDICATORS: A CURRENT VALUE APPROACH TO HUMAN RESOURCES ACCOUNTING

REPORT II

INTERNAL CONSISTENCIES AND RELATIONSHIPS TO PERFORMANCE IN ORGANIZATION VI*

Patricia A. Pecorella
David G. Bowers

The Navy and Marine Corps, like other large organizations, need information systems which will allow them to assess the impact current management practices are likely to have on the future effectiveness of the organization. Conventional accounting systems commonly lack this capability because they provide readings on events and conditions at the outcome stage only, e.g., detailed statements of production for the previous month. They give no indication as to what conditions and events led to the reported outcomes since they traditionally do not include measurements of the human organization and its relationship to events at the outcome stage. Attempts to gather these additional measurements are known as Human Resources Accounting (Hermanson, 1964). To date, three routes or methods have been conceptualized:

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*Results of similar analyses for Organizations I-V are reported in Pecorella, P.A. and Bowers, D.G. "Future Performance Trend Indicators: A Current Value Approach to Human Resources Accounting - Report I." Ann Arbor: University of Michigan, 1976. A more complete conceptual statement of the issues involved in current value human resources accounting may be found in Bowers, D.G. and Pecorella, P.A., "A Current Value Approach to HRA," Accounting Forum, 1975, 45 (2), 25-40.

(1) The "Incurred Cost" method -- measuring the amounts already invested in the human organization (Brummet, Pyle, & Flamholtz, 1968; Pyle, 1970a, 1970b).

(2) The "Replacement Cost" method -- estimating the cost of replacing the organization's human resources (Flamholtz, 1969).

(3) The "Present Value" method -- estimating the future productive potential of current human resources (Likert, 1967; Likert, Bowers, & Norman, 1969; Likert & Bowers, 1973).

Our research is concerned with developing and refining a methodology for Human Resources Accounting of a present value type. More specifically this research focuses on (1) establishing the relationships between characteristics of the human organization and its organizational effectiveness and (2) estimating the dollar (or dollar-related) impact of positive and negative changes in the state of the human organization upon an organization's future effectiveness.

A recent technical report addressed several issues preparatory to construction of a suitable file for generating a system of future performance trend indicators. The issues addressed included:

(1) The strength of internal consistency (alpha) reliability coefficients for the key survey indexes.

(2) The size of performance periods, that is, the number of months that a "period" may reasonably be judged to contain for each organization, together with internal consistency (alpha) reliability coefficients for the multi-month periods so defined.

(3) The size of zero-order survey-to-performance correlation coefficients, by site.

Analyses were conducted for the first five organizational data sets (of six ultimately to be used). The conclusions were that the data examined were of the required quality in three out of five of the organizations considered. The three which remain provided ample numbers of cases. Two principle performance measures were available with sufficient frequency across these sites to be included in subsequent analyses: total variable expense, which is an ultimate criterion measure of cost performance, and absenteeism rate, which is a penultimate, human cost measure. Two survey measures, established as somewhat experimental were dropped from the analyses as having insufficient internal consistency.

In the present report, results of these basic analyses will be described for Organization VI. In subsequent reports performance data will be transformed to a scale common to all sites, and a master file generated. Multivariate analyses will then be conducted to determine both size and lag time of the relationship of the human organization's functional state to its performance outcomes. As a final set of steps in the subsequent phase of the research, value attribution will occur; that is, dollar conversions will be undertaken.

METHODS

Organization VI

Organization VI had two waves of organizational functioning data in addition to measures of performance. It is a multi-location manufacturing firm. Three plants of this firm were studied between 1966 and 1968 as part of the Michigan Inter-Company Longitudinal Study (ICLS).

Measures of Organizational Functioning

ICLS (as first described by Likert, et. al., 1969) was begun in order to make feasible the systematic investigation of relationships between characteristics of the human organization and performance levels of organizational units. The Survey of Organizations questionnaire (SOO), a machine-scored, standardized instrument was developed as an integral part of this research program. The questionnaire was needed to collect comparable data from diverse organizational sites in an economical and efficient manner. The first form of the SOO was completed in 1966. While some modifications have since been made in the SOO, most of the "core" measures remained consistent across the ICLS sites.

In its current edition, the SOO includes 124 items focusing on various aspects of the work setting. Six items focus on individual demographic characteristics. Forty-two additional spaces are provided for supplementary questions tailored to a particular organization of study. Responses to

most items regarding the work setting are recorded on a five-point extent scale ranging from (1) "to a very little extent" to (5) "to a very great extent." A description of the complete instrument together with statistical information regarding the validity and reliability of its component elements is provided by Taylor and Bowers (1972) in the questionnaire manual.

Five key dimensions of organizational functioning are measured by the SOO: Organizational Climate, Supervisory Leadership, Peer Leadership, Group Process, and Satisfaction. Organizational Climate refers to the organization-wide conditions, policies, and procedures within which each work group operates. These conditions and policies are created for a work group by other groups, especially by those above it in the organizational hierarchy. Climate conditions set bounds on what does and what can go on within any work group. Aspects of climate can help or hinder conditions within groups, or may do both at the same time. Supervisory Leadership is comprised of interpersonal and task-related behaviors which describe the way supervisors are viewed by their subordinates. Peer Leadership comprised of interpersonal and task-related behaviors of work group members toward each other. Group Process measures those things which characterize the group as a team and whether group members work together well or poorly. The way in which group members share information, make decisions, and solve problems determines the group's effectiveness and the quality of its outputs. Satisfaction measures whether organization members are satisfied with economic and related rewards, the immediate supervisor, the organization as a system, the job as a whole, compatibility with fellow work group members, and present and future progress within the organization.

In its current version, 16 major indexes in the SOO measure these five dimensions of organizational functioning. In the present case, two Climate indexes (Technological Readiness and Lower Level Influence) have been eliminated due to the unsatisfactory reliability (alpha) coefficients they displayed in our prime data sets (see Pecorella and Bowers, 1976). In addition, Organization VI had no measure of Group Process. Thus, we are left with 13 key SOO indices as measures of organizational functioning.

The SOO was administered twice to the three plants in Organization VI -- in April 1966 and again in April 1967. Cronback's Coefficient Alpha (Bohrnstedt, 1969) and Scott's Homogeneity Ratio (Scott, 1960) were computed to assess the internal consistency of the 13 key SOO indices in the three plants. Table 2 summarizes the results of these tests for each wave of survey data. As the results in Table 2 show, the SOO indices displayed moderate to high internal consistency.*

Measures of Performance

In earlier reports (Pecorella & Bowers, 1976; Bowers & Pecorella, 1975) two levels of organizational effectiveness criteria were identified. Ultimate criteria are those organizational outcomes pertinent to the organization's production goals and include variables like volume, cost, quality, and efficiency. Penultimate criteria are intermediate rather than end-result organizational outcomes and include variables like attendance, human costs, and resource development.

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*It should be noted that statistics on the SOO's internal consistency were computed using group data rather than individual data. The data were aggregated because all later analyses will also be conducted at the group level.

TABLE 1

ITEMS COMPRISING THE

SURVEY OF ORGANIZATIONS INDICES

The indices below are made up of items to which responses are given on a five-point extent scale: 1 = to a very little extent, 2 = to a little extent, 3 - to some extent, 4 = to a great extent, and 5 = to a very great extent.*

Organizational Climate

Human Resources Primacy (HRP)

To what extent does this organization have a real interest in the welfare and happiness of those who work here?

How much does this organization try to improve working conditions?

To what extent are work activities sensibly organized in this organization?

Decision Making Practices (DMP)

How are objectives set in this organization?

1. Objectives are announced with no opportunity to raise questions or give comments.
2. Objectives are announced and explained and an opportunity is then given to ask questions.
3. Objectives are drawn up, but are discussed with subordinates and sometimes modified before being issued.
4. Specific alternative objectives are drawn up by supervisors, and subordinates are asked to discuss them and indicate the one they think is best.
5. Problems are presented to those persons who are involved, and the objectives felt to be best are then set by the subordinates and the supervisors jointly, by group participation and discussion.

In this organization to what extent are decisions made at those levels where the most adequate and accurate information is available?

When decisions are being made, to what extent are the persons affected asked for their ideas?

People at all levels of an organization usually have know-how that could be of use to decision-makers. To what extent is information widely shared in this organization so that those who make decisions have access to all available know-how?

*Exceptions are starred.

Communication Flow (Comm)

How adequate for your needs is the amount of information you get about what is going on in other departments or shifts?

How receptive are those above your supervisor to your ideas and suggestions?

To what extent are you told what you need to know to do your job in the best possible way?

Motivational Conditions (Motiv)

*How are differences and disagreements between units or departments handled in this organization?

1. Disagreements are almost always avoided, denied, or suppressed
2. Disagreements are often avoided, denied or suppressed
3. Sometimes disagreements are accepted and worked through; sometimes they are avoided or suppressed
4. Disagreements are usually accepted as necessary and desirable and worked through
5. Disagreements are almost always accepted as necessary and desirable and worked through

*Why do people work hard in this organization?

1. Just to keep their jobs and avoid being chewed out
2. To keep their jobs and to make money
3. To keep their jobs, make money, and to seek promotions
4. To keep their jobs, make money, seek promotions, and for the satisfaction of a job well done
5. To keep their jobs, make money, seek promotions, do a satisfying job, and because other people in their work group expect it

To what extent are there things about working here (people, policies, or conditions) that encourage you to work hard?

---

*Exceptions are starred.

Supervisory Leadership

Supervisory Support (SS)

How friendly and easy to approach is your supervisor?

When you talk with your supervisor, to what extent does he pay attention to what you're saying?

To what extent is your supervisor willing to listen to your problems?

Supervisory Team Building (STB)

To what extent does your supervisor encourage the persons who work for him to work as a team?

To what extent does your supervisor encourage the persons who work for him to work as a team?

Supervisory Goal Emphasis (SGE)

How much does your supervisor encourage people to give their best effort?

To what extent does your supervisor maintain high standards of performance?

Supervisory Work Facilitation (SWF)

To what extent does your supervisor show you how to improve your performance?

To what extent does your supervisor provide you with the help you need so that you can schedule work ahead of time?

To what extent does your supervisor offer new ideas for solving job-related problems?

Peer Leadership

Peer Support (PS)

How friendly and easy to approach are the persons in your work group?

When you talk with the persons in your work group, to what extent do they pay attention to what you're saying?

To what extent are persons in your work group willing to listen to your problems?

Peer Team Building (PTB)

How much do persons in your work group encourage each other to work as a team?

How much do persons in your work group emphasize a team goal?

To what extent to do persons in your work group exchange opinions and ideas?

Peer Goal Emphasis (PGE)

How much do persons in your work group encourage each other to give their best effort?

To what extent do persons in your work group maintain high standards of performance?

Peer Work Facilitation (PWF)

To what extent do persons in your work group help you find ways to do a better job?

To what extent do persons in your work group provide the help you need so that you can plan, organize, and schedule work ahead of time?

To what extent do persons in your work group offer each other new ideas for solving job-related problems?

Satisfaction (Sat)

*All in all, how satisfied are you with the persons in your work group?

*All in all, how satisfied are you with your supervisor?

*All in all, how satisfied are you with your job?

*All in all, how satisfied are you with this organization compared to most others?

*Considering your skills and the effort you put into the work, how satisfied are you with your pay?

*How satisfied do you feel with the progress you have made in this organization up to now?

*How satisfied do you feel with your chance for getting ahead in this organization?

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neither satisfied nor dissatisfied
4. Fairly satisfied
5. Very satisfied

---

*Exceptions are starred.

TABLE 2

ALPHA'S AND HOMOGENEITY RATIOS FOR
MAJOR SOO INDICES IN ORGANIZATION VI

Index	PLANT I Alpha	PLANT I HR	PLANT 2 Alpha	PLANT 2 HR	PLANT 3 Alpha	PLANT 3 HR
			WAVE 1			
Communication Flow	.83	.62	.86	68	.75	.51
*Motivational Conditions	.78	.65	.82	.69	.78	.66
*Human Resources Primacy	.91	.84	.90	.83	.93	.87
Supervisory Support	.89	.73	.94	.83	.91	.77
Supervisory Goal Emphasis	.65	.49	.78	.64	.79	.65
Supervisory Work Facilitation	.89	.73	.87	.69	.90	.76
Supervisory Team Building	.89	.80	.89	.80	.89	.81
Peer Support	.82	.61	.84	.64	.87	.69
Peer Goal Emphasis	.77	.65	.78	.65	.78	.65
Peer Work Facilitation	.88	.72	.87	.68	.86	.68
Peer Team Building	.87	.70	.85	.67	.90	76
*Satisfaction	.72	.36	.73	.37	.79	.45
			WAVE 2			
Decision Making Practices	.90	.69	.85	.60	.90	.69
Communication Flow	.84	.65	.79	.57	.84	.65
*Motivational Conditions	.84	.74	.82	.72	.84	.74
*Human Resources Primacy	.91	84	.88	.78	.91	.84
Supervisory Support	.91	.78	.94	.85	.91	.78
Supervisory Goal Emphasis	.87	.78	.90	.82	.87	.78
Supervisory Work Facilitation	.92	.79	.90	.76	.92	.79
Supervisory Team Building	.86	.76	.86	.76	.86	.76
Peer Support	.92	.81	.85	.65	.92	.81
Peer Goal Emphasis	.87	.78	.86	.77	.87	.78
Peer Work Facilitation	.91	.77	.75	.50	.91	.77
Peer Team Building	.91	.77	.88	.72	.91	.77
*Satisfaction	.83	.51	.80	.46	.83	.51

*If an asterisk (*) appears before the index title, one or more of the items in that index were missing.

Organization VI provided one general cost measure, referred to here as total variable expense (TVE) and one measure of total absence (ABS). Definitions of these two measures and the number of months covered by each are provided in Table 3.

The performance data reflected "cost center" performance. As with earlier analyses in this project (Pecorella & Bowers, 1976), performance scores for cost centers were imputed to all work groups included in each cost center. Table 4 lists the N's before and after imputation.

Analysis Procedures

This report had two analytic tasks: (1) to identify sufficiently stable performance periods within each site which were also comparable across sites and (2) to explore the relationship between the SOO and performance. Analyses were performed separately for each plant.

A non-metric technique called Smallest Space Analysis (SSA) was used to identify the performance months to be combined to form performance periods. The specific program used as MINISSA which is available as a public file on the University of Michigan's terminal system.

SSA takes as input similarity or dissimilarity measures (s) of all variables from some set of variables. Ordinal distances (d) among these pairs of variables are computed in such a way that monotonicity is maintained. When the relationships among variables are measured by similarity coefficients, the monotonic function is defined as:

$$d_{ij} < d_{kl} \text{ when } s_{ij} > s_{kl}$$

TABLE 3

MONTHLY MEASURES OF PERFORMANCE
IN ORGANIZATION VI

Title	Total Variable Expense (TVE)	Total Absence (ABS)
Definition	The largest actual expense figure from each cost center, encompassing all expenses as a percentage of the budgeted figures for the cost centers.	The number of employees absent as a percentage of the total number of employees.
Duration	November 1965-August 1968	November 1965-September 1966 (Plants 2 and 3 only)

TABLE 4

PERFORMANCE DATA - N BEFORE AND AFTER

IMPUTATION IN ORGANIZATION VI

Plant	Before Imputation N	After Imputation N
1	55	62 (TVE only)
2	42	42
3	53	89

The measures used in the present case were Pearson product moment coefficients or correlation coefficients. These coefficients show the strength of association between variables, and as such are measures of similarity. Once the distance measures are determined, the SSA technique represents the resulting relationships in some N-dimensional space.

There are a number of advantages of SSA and other non-metric scaling techniques over the traditional factor analytic methods. First, the level of the data need not be intervally scaled. SSA uses an ordinal set of relationships and concern for violating assumptions required for factor analysis is greatly reduced. The second advantage is the final representation's close approximation to the original data. Third, the final representation requires fewer spatial dimensions to represent the original data. Thus, the final representation is more visually interpretable than other approaches. Finally, SSA can determine more subtle differences among sets of points and relationships than can factor analytic techniques.

An understanding of certain parts of the SSA output is critical for the present analysis. First, the system outputs the coordinates for each element's position in some N-dimensional space. Each of the elements can be plotted to visually represent its position with respect to the other elements. For the present study, the elements are months of performance data. The number of dimensions is determined by the fewest number required to represent the data while maintaining monotonicity. The recommended criterion for monotonicity is that the Guttman-Lingoes Coefficient of Alienation be less than or equal to 0.15. When this criterion is met, the program plots the elements in the appropriate number of dimensions.

Thus, one criterion for combining certain months of performance was that they be empirically represented in space close to one another. Another criterion was that the months defining a performance period be contiguous.*

The stability, or internal consistency, of the performance periods suggested by the SSA were then assessed using Cronbach's alpha coefficient and Scott's Homogeneity Ratio (HR).

This two-step procedure for defining stable performance periods -- SSA followed by alpha and HR tests -- permitted the periods identified to be of various lengths within one site, and also reveal any differences in performance period lengths and stability across sites. Thus, the periods were matched more closely to actual performance patterns in the sites than if set performance period lengths (e.g., quarterly data) were imposed.

To investigate the relationships between the SOO and performance Pearson r correlations were employed. Each major index was correlated with each performance period of each performance measure.

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*References for the SSA technique include Guttman (1968); Lingoes (1965); Lingoes and Guttman (1967); Lingoes and Roskam (1971); Napior (1972); Roskam and Lingoes (1970); Shepard (1972).

RESULTS

This section of the report describes the performance periods identified for each plant and performance measure, the internal stability of each performance period, and the correlations between the SOO and the performance periods.

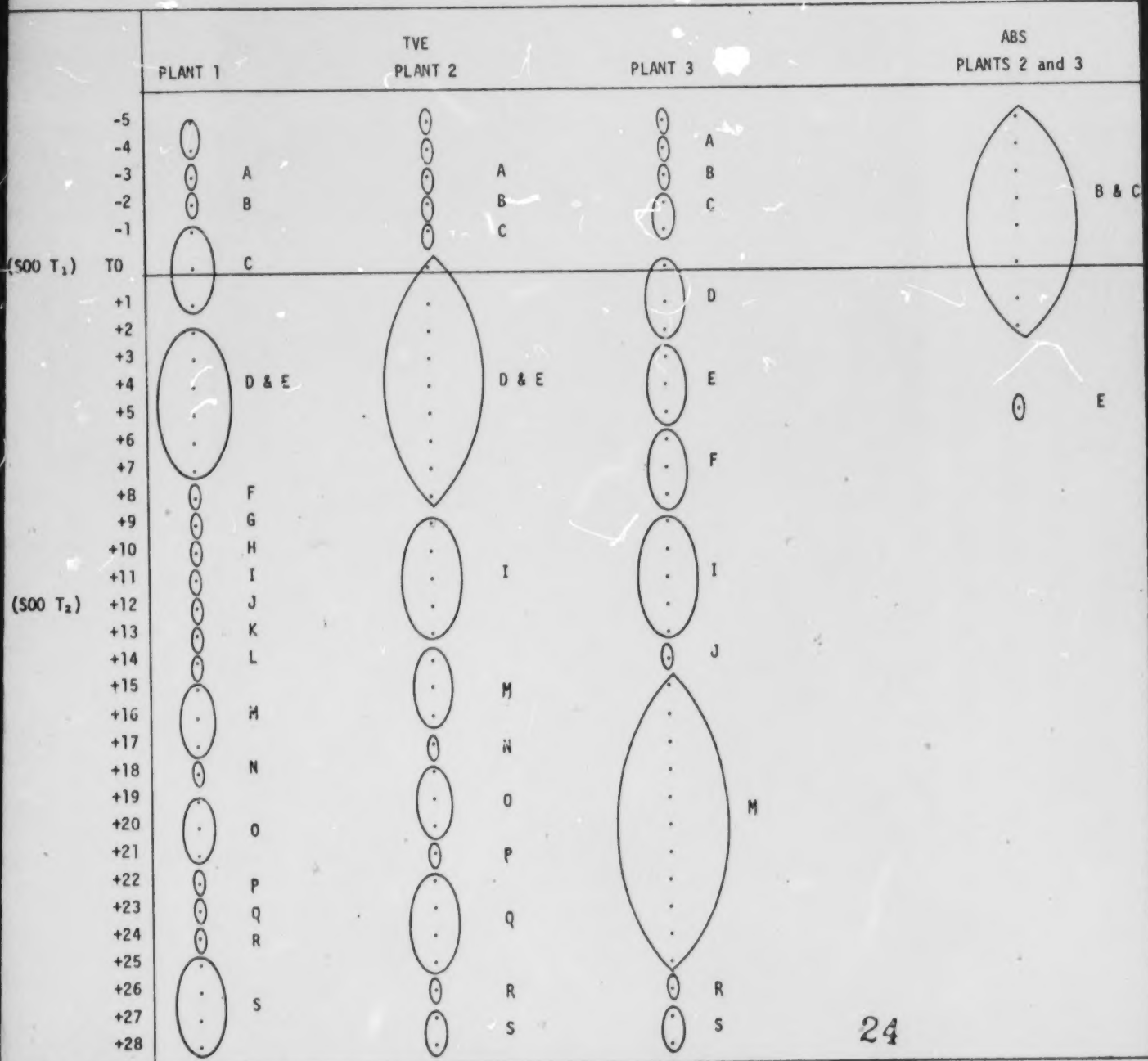
Identifying Performance Periods

A note about format: The SSA results were summarized via figures which portray the way in which performance months clustered. In the figures, performance months were ordered relative to when the SOO was first administered. Thus, the performance month occurring one month previous to the first SOO administration was "minus one month" (-1m), the one occurring the same month as the survey was TO, the one occurring one month subsequent to the survey was +1m, etc. Each performance month is represented in the figure by a dot. Performance months which the SSA analyses indicated as being close together were circled. Performance months were required to be sequential in order to be clustered into a performance period. The performance periods were labelled A through S. Within each measure, performance periods were roughly comparable across sites in terms of their time relation to the first SOO administration. For the reader who is interested in the more basic statistical elements of defining the performance periods, descriptive statistics and the correlations among performance months are presented by site, for each performance measure, in Appendices A and B.

A Smallest Space Analysis was performed for each outcome measure, by plant, and the results of these analyses are in Appendix C. Figure 1 displays the performance periods suggested by the SSA results. The data extended from -5m to +28m. Plant I had 19 TVE periods; Plant 2 had 14 TVE periods and two ABS periods; Plant 3 had 12 TVE periods and two ABS periods. The performance periods included from one to 11 months.

Figure 1

Time Periods for Performance Data in Organization VI



Alpha coefficients and homogeneity ratios for the performance periods including more than one month are presented in Table 5. The internal consistency of the periods were moderate to high. The alpha's ranged from .67 to .99. The HR's ranged from .43 to .99.

Descriptive statistics for the periods and correlations among periods and measures are provided in Appendices D and E.

Correlations Between SOO and Performance

The relationship between SOO and organizational performance was examined using Pearson r correlations. Correlations were computed by plant for two waves of SOO data and for all periods of each performance measure. For readers interested in the entire array of correlations, the correlation matrices are presented in Appendix F. Summaries of the results were prepared and were the basis for discussion in the text of this report.

The data summaries highlight three dimensions of the relationships between the SOO and performance, namely differences in correlations by:

- Area of organizational functioning (Climate, Supervisory Leadership, Peer Leadership, and Satisfaction).
- Performance period (i.e., lag time between SOO and performance).
- Performance measure (TVE, ABS).

The summary indicators, designed to take account of both correlation strength and direction included:

- Percent significant correlations.
- Percent significant correlations in the expected direction (i.e., high SOO associated with low costs and absenteeism).
- Median significant correlation.
- Highest significant correlation.

TABLE 5

ORGANIZATION VI - ALPHA COEFFICIENTS AND HOMOGENEITY RATIOS FOR PERFORMANCE PERIODS

Measure	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
TVE																			
Plant I																			
# Variables	1	1	3	6*	6*	1	1	1	1	1	1	1	3	1	3	1	1	1	4
alpha			.67	.83	.83								.83		.87				.80
HR			.43	.48	.48								.62		.77				.50
Plant 2																			
# Variables	1	1	1	9*	9*	MD	MD	MD	5	MD	MD	MD	3	1	3	1	4	1	2
alpha				.91	.91				.93				.92		.94				.83
HR				.54	.54				.77				.83		.87		.76		.75
Plant 3																			
# Variables	1	1	2	3	3	3	MD	MD	5	1	MD	MD	11	MD	MD	MD	MD	1	2
alpha			.83	.72	.90	.99			.99				.94						.76
HR			.71	.99	.79	.99			.94				.63						.62
ABS																			
Plants 2 and 3																			
# Variables	MD	8*	8*	MD	1	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MDM	MD
alpha		.90	.90																
HR		.54	.54																

*Adjacent periods when marked with an asterisk contain the same performance months.

Plant I

Plant I had data for TVE periods A through S. No absence data were provided from this plant.

Tables 6 to 10 summarize the correlations between the SOO and performance by wave, measure, performance period, and area of organizational functioning. Tables 6 and 7 present the most detailed summaries while Tables 8 to 10 each emphasize one dimension of the relationships. The findings in these tables suggest that:

1. The percentage of significant correlations did not vary substantially by area of organizational functioning: The lowest percentage was 9% for the Supervisory Leadership indices with 77% of these in the expected direction. The highest percentage significant was 19% for the Climate indices but with only 39% of the coefficients in the expected direction (see Table 8).
2. Correlations that were significant were moderate to low in strength. The median correlations ranged from -.27 to -.37. The highest correlations ranged from -.27 to -.44 (see Tables 6 and 7).
3. The percentage of significant correlations in the expected direction varied by area of organizational functioning and performance period. There were more reversals in the Climate measures than in other areas (see Table 8). No clear pattern of variation were apparent across performance periods (see Tables 6 and 7).

TABLE 6

ORGANIZATION VI - SUMMARY OF CORRELATIONS BETWEEN
SOO WAVE 1 AND PERFORMANCE

(N = 44-55 Groups)

Plant 1

Performance Periods	A	B	C ↓ SOO T_1	D	E	F	G	H	I ↓ SOO T_2	J	K	L	M	N	O	P	Q	R	S
TVE																			
% SOO indices with significant r's	0%	64%	21%	21%	21%	0%	43%	0%	14%	7%	29%	7%	7%	0%	79%	7%	0%	0%	7%
% significant index r's in expected direction	-	100%	100%	100%	100%	-	0%	-	0%	100%	0%	100%	100%	-	0%	100%	-	-	100%
median significant r	-	-.33	-.27	-.29	-.29	-	.29	-	.28	-.35	-.33	-.29	-.30	-	.27	-.27	-	-	-.27
highest r	-	-.44	-.28	-.30	-.30	-	.42	-	.29	-.35	.45	-.29	-.30	-	.27	-.27	-	-	-.27

TABLE 7

ORGANIZATION VI - SUMMARY OF CORRELATIONS BETWEEN
SOO WAVE 2 AND PERFORMANCE

(N = 47-57 Groups)

Plant 1

Performance Periods	SOO T_1 ↓								SOO T_2 ↓									
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
TVE																			
% SOO indices with significant r's	0%	29%	71%	36%	36%	0%	50%	0%	7%	0%	64%	0%	0%	0%	0%	0%	29%	0%	0%
% significant index r's in expected direction	-	100%	100%	100%	100%	-	0%	-	0%	-	0%	-	-	-	-	-	100%	-	-
median significant r	-	-.28	-.30	-.37	-.37	-	.34	-	.27	-	.29	-	-	-	-	-	-.31	-	-
highest r	-	-.32	-.38	-.38	-.38	-	.36	-	.27	-	.42	-	-	-	-	-	-.32	-	-

TABLE 8

ORGANIZATION VI

SUMMARY OF CORRELATIONS BETWEEN THE SOO AND PERFORMANCE BY AREA OF ORGANIZATIONAL FUNCTIONING[1]

(N = 44-57 Groups)

Plant 1

	% SOO Indices With Significant R's	% Significant r's In Expected Direction	Highest Significant r
TVE			
Climate	19%	39%	-.44
Supervisory Leadership	9%	77%	-.38
Peer Leadership	16%	88%	-.38
Group Process	MD		
Satisfaction	13%	60%	-.37

[1]In the calculation of figures in this table, the correlations across all performance periods for both waves of SOO data are included.

TABLE 9

ORGANIZATION VI

MEAN PERCENTAGE OF SIGNIFICANT CORRELATIONS
BETWEEN SOO INDICES AND
PERFORMANCE INDICES BY PERFORMANCE PERIOD[1]

Plant 1

Performance Measure	Performance Periods				
	Mean % of Significant Correlations				
	A-C	D-F	G-I	J-M	N-S
TVE SOO T_1	28%	14%	19%	12%	3%

[1]Wave 1 SOO data only.

TABLE 10

ORGANIZATION VI

MEAN PERCENTAGE OF SIGNIFICANT CORRELATIONS
BETWEEN THE SOO AND PERFORMANCE BY PERFORMANCE MEASURE[1]

Plant 1

Performance Measure	Mean % of Significant Correlations with SOO	Mean % of Significant Correlations in Expected Direction
TVE	15%	67%

[1]Across all performance periods and for both waves of SOO data.

4. Higher percentages of correlations were significant in the periods close to and surrounding the SOO Wave 1 administration than in later periods (see Table 9).

Plant 2

Plant 2 had data for 13 TVE periods and for three Absence periods. Tables 11 to 15 summarize the correlations between the SOO and performance by wave, measure, performance period, and area of organizational functioning. Tables 11 and 12 present the most detailed summaries. Tables 13 to 15 each emphasize one dimension of the relationships. The findings in these tables suggest that:

1. The relationship between the SOO and TVE did not vary substantially by area of organizational functioning. The lowest percentage was 42% for the climate indexes with 36% of these in the expected direction. The highest percentage significant was 55% with 35% of the coefficients in the expected direction (see Table 13).
2. The relationship between the SOO and Absence varied by area of organizational functioning. All of the significant coefficients were in the expected direction. However, 53% of correlations between climate indexes and Absence were significant, while only 17% of the Satisfaction, 4% of the Supervisory Leadership, and 0% of the Peer Leadership correlations were (see Table 13).

TABLE 11

ORGANIZATION VI - SUMMARY OF CORRELATIONS BETWEEN
SOO WAVE 1 AND PERFORMANCE
(N = 29-37 Groups)
Plant 2

Performance Periods	A	B	C	SOO T_1 ↓ D	E	F	G	H	I	SOO T_2 ↓ J	K	L	M	N	O	P	Q	R	S
TVE																			
% SOO indexes with significant r's	0%	43%	0%	79%	79%	MD	MD	MD	93%	MD	MD	MD	64%	0%	93%	7%	100%	0%	100%
% significant index r's in expected direction	-	0%	-	0%	0%				100%				100%	-	100%	100%	0%	-	0%
median significant r	-	.39	-	.51	.51				-.49				-.46	-	-.48	-.40	.49	-	.50
highest r	-	.42	-	.58	.58				-.58				-.54	-	-.54	-.40	.63	-	.67
ABS																			
% SOO indexes with significant r's	MD	0%	0%	MD	29%	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD
% significant index r's in expected direction		-	-		100%														
median significant r		-	-		-.43														
highest r		-	-		-.49														

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TABLE 12

ORGANIZATION VI - SUMMARY OF CORRELATIONS BETWEEN
SOO WAVE 2 AND PERFORMANCE
(N = 28-37 Groups)
Plant 2

Performance Periods	A	B	C	SOO T_1 ↓ D	E	F	G	H	I	SOO T_2 ↓ J	K	L	M	N	O	P	Q	R	S
TVE																			
% SOO indexes with significant r's	0%	79%	0%	100%	100%	MD	MD	MD	71%	MD	MD	MD	43%	0%	50%	0%	57%	0%	100%
% significant index r's in expected direction	-	0%	-	0%	0%				100%				100%	-	100%	-	0%	-	0%
median significant r	-	.37	-	.51	.51				-.48				-.42	-	-.49	-	.46	-	.52
highest r	-	.49	-	.63	.63				-.55				-.45	-	-.53	-	.51	-	.63
ABS																			
% SOO indexes with significant r's	MD	0%	0%	MD	50%	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD
% significant index r's in expected direction		-	-		100%														
median significant r		-	-		-.43														
highest r		-	-		-.49														

30.

TABLE 13

ORGANIZATION VI

SUMMARY OF CORRELATIONS BETWEEN THE SOO AND PERFORMANCE
BY AREA OF ORGANIZATIONAL FUNCTIONING[1]

(N = 28-37 Groups)

Plant 2

	% SOO Indices With Significant r's	% Significant r's In Expected Direction	Highest Significant r
TVE			
Climate	42%	36%	-.60
Supervisory Leadership	55%	35%	.61
Peer Leadership	48%	30%	.63
Group Process	MD		
Satisfaction	46%	25%	.62
ABS			
Climate	53%	100%	.49
Supervisory Leadership	4%	100%	-.37
Peer Leadership	0%		
Group Process	MD		
Satisfaction	17%	100%	-.39

[1]In the calculation of figures in this table, the correlations across all performance periods for both waves of SOO data are included.

TABLE 14

ORGANIZATION VI

MEAN PERCENTAGE OF SIGNIFICANT CORRELATIONS
BETWEEN SOO INDICES AND
PERFORMANCE INDICES BY PERFORMANCE PERIOD[1]

Plant 2

Performance Measure	Performance Periods				
	Mean % of Significant Correlations				
	A-C	D-F	G-I	J-M	N-S
TVE SOO T_1	14%	53%	93%	64%	50%
ABS SOO T_1	0%	29%	MD	MD	MD

[1]Wave 1 SOO data only.

TABLE 15

ORGANIZATION VI

MEAN PERCENTAGE OF SIGNIFICANT CORRELATIONS
BETWEEN THE SOO AND PERFORMANCE BY PERFORMANCE MEASURE[1]

Plant 2

Performance Measure	Mean % of Significant Correlations with SOO	Mean % of Significant Correlations in Expected Direction
TVE	48%	41%
ABS	13%	100%

[1]Across all performance periods and for both waves of SOO data.

3. Correlations that were significant were moderate to high in strength. The median correlations ranged from .37 to .52. The highest correlations ranged from .42 to .67 (see Tables 11 and 12).
4. In terms of time lag, fewer correlations were significant in the periods preceeding the first SOO administration (Periods A to C) and in those most distant from this survey administration (Periods N to S). The relationship between TVE and the SOO peaked during periods G-I. Absence data were not available for enough periods to indicate a "peak" period (see Table 14).
5. Overall, a higher percentage of correlations were significant for TVE (48%) than for Absence (13%). Fewer of the correlations were in the expected direction for TVE (41%) than for Absence (100%), however (see Table 15).

Returning to Tables 11 and 12, we see that the correlations for TVE fall into a pattern: For several periods the relationships were in the reverse direction from that expected, (Periods A to E) then in the expected direction (Periods F to P), and then reversed again (Periods R to S). Some periods had missing data; nevertheless, the direction of the relationships seemed to vary in cycles. These cycles were noted in an earlier discussion of this particular plant and was explained in the following manner:

> Early in the period of the project with this organization, it was discovered that...the company's lay-off practices were such that personnel from the ordinarily over-manned, inefficient units were transferred into the better performing, "leaner" units to do make-work maintenance jobs. [Thus when business slowdowns occurred, these practices meant that] the poor looked good and the good poor, in almost direct mirror image to their "real" excellence. (Taylor & Bowers, 1972, p. 92)

Given this circumstance, it seems best to exclude the TVE performance periods for this plant that corresponded to the instances described above, Periods A through E and R through S.

Plant 3

Plant 3 had data for 11 TVE periods and for three Absence periods. Tables 16 to 20 summarize the correlations between the SOO and performance by wave, measure, performance period, and area of organizational functioning. Tables 16 and 17 present the detailed summaries. Tables 18 to 20 each emphasize one dimension of the relationships. The findings in these tables suggest that:

1. While the relationship between the SOO and TVE varied slightly by area of organizational functioning, small percentages were significant overall and this overshadowed any differences. Four percent of the Satisfaction, 7% of the Climate, 8% of the Supervisory Leadership, and 12% of the Peer Leadership indices were significant. Furthermore, in some cases the correlations were not in the expected direction (see Table 18).

TABLE 16

ORGANIZATION VI - SUMMARY OF CORRELATIONS BETWEEN
SOO WAVE 1 AND PERFORMANCE
(N = 70-77 Groups)
Plant 3

Performance Periods	A	B	C	SOO T_1 ↓ D	E	F	G	H	I	SOO T_2 ↓ J	K	L	M	N	O	P	Q	R	S
TVE																			
% SOO indexes with significant r's	7%	0%	0%	0%	7%	7%	MD	MD	7%	7%	MD	MD	0%	MD	MD	MD	MD	14%	0%
% significant index r's in expected direction	100%	-	-	-	0%	100%			0%	0%			-					0%	-
median significant r	-.22	-	-	-	.23	-.22			.25	.25			-					.24	-
highest r	-.22	-	-	-	.23	-.22			.25	.25			-					.28	-
ABS																			
% SOO indexes with significant r's	MD	36%	36%	MD	14%	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD
% significant index r's in expected direction		100%	100%		100%														
median significant r		-.26	-.26		-.22														
highest r		-.28	-.28		-.28														

TABLE 17

ORGANIZATION VI - SUMMARY OF CORRELATIONS BETWEEN
SOO WAVE 2 AND PERFORMANCE
(N = 68-75 Groups)
Plant 3

Performance Periods	A	B	C	SOO T_1 ↓ D	E	F	G	H	I	SOO T_2 ↓ J	K	L	M	N	O	P	Q	R	S
TVE																			
% SOO indexes with significant r's	7%	7%	0%	7%	0%	7%	MD	MD	7%	0%	MD	MD	43%	MD	MD	MD	MD	21%	43%
% significant index r's in expected direction	100%	100%	-	100%	-	100%			0%	-			100%					0%	100%
median significant r	-.26	-.24	-	-.24	-	-.24			.25	-			-.26					.28	-.24
highest r	-.26	-.24	-	-.24	-	-.24			.25	-			-.29					.35	-.30
ABS																			
% SOO indexes with significant r's	MD	21%	21%	MD	0%	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD
% significant index r's in expected direction		100%	100%		-														
median significant r		-.23	-.23		-														
highest r		-.24	-.24		-														

37

TABLE 18

ORGANIZATION VI

SUMMARY OF CORRELATIONS BETWEEN THE SOO AND PERFORMANCE BY AREA OF ORGANIZATIONAL FUNCTIONING[1]

(N = 68-77 Groups)

Plant 3

	% SOO Indices With Significant r's	% Significant r's In Expected Direction	Highest Significant r
TVE			
Climate	7%	25%	.35
Supervisory Leadership	8%	100%	-.30
Peer Leadership	12%	82%	-.27
Group Process	MD		
Satisfaction	4%	0%	.28
ABS			
Climate	13%	100%	-.24
Supervisory Leadership	25%	100%	-.27
Peer Leadership	33%	100%	-.28
Group Process	MD		
Satisfaction	0%		

[1]In the calculation of figures in this table, the correlations across all performance periods for both waves of SOO data are included.

TABLE 19

ORGANIZATION VI

MEAN PERCENTAGE OF SIGNIFICANT CORRELATIONS
BETWEEN SOO INDICES AND
PERFORMANCE INDICES BY PERFORMANCE PERIOD[1]
Plant 3

Performance Measure	Performance Periods				
	Mean % of Significant Correlations				
	A-C	D-F	G-I	J-M	
TVE SOO T_1	2.3%	4.7%	7%	3%	7%
ABS SOO T_1	36%	14%	MD	MD	MD

[1]Wave 1 SOO data only.

TABLE 20

ORGANIZATION VI

MEAN PERCENTAGE OF SIGNIFICANT CORRELATIONS
BETWEEN THE SOO AND PERFORMANCE BY PERFORMANCE MEASURE[1]

Plant 3

Performance Measure	Mean % of Significant Correlations with SOO	Mean % of Significant Correlations in Expected Direction
TVE	9%	57%
ABS	21%	100%

[1]Across all performance periods and for both waves of SOO data.

2. All of the significant correlations between the SOO and Absence were in the expected direction. Peer Leadership was the most strongly related to Absence; 33% of the indexes had significant correlations. By comparison, none of the Satisfaction correlations were significant (see Table 18).
3. Correlations that were significant were moderate to low in strength. The median correlations ranged from -.22 to .28. The highest correlations ranged from -.22 to .35 (see Tables 16 and 17).
4. Time lag was difficult to assess for this plant because of the low percentage of significant TVE correlations and the few periods of Absence data available.
5. Overall, a higher percentage of correlations were significant for Absence (21%) than for TVE (9%). Furthermore, 100% of the significant Absence correlations were in the expected direction versus 57% of the TVE correlations.

DISCUSSION OF THE RESULTS

The findings presented in the preceding sections are germane to three questions, answers to which determine whether Organization VI will be included in the more complex analyses yet to come.

(1) Is there evidence that the Survey of Organizations measures are sufficiently reliable (internally consistent) in these specific settings to be used in the proposed analyses?

(2) Is there evidence that the performance measures available for these organizations are sufficiently reliable (internally consistent) to be used in the proposed analyses?

(3) Are the requisite relationships between survey measures and performance measures, necessary for the proposed analyses, in fact in place?

The results provide a clear and positive answer to the first question. The internal consistencies for survey measures reported are quite high: alpha coefficients generally range between .75 and .90. We can be reasonably certain, therefore, that the measures of the human organization which we propose to use are quite internally consistent.

Reliability of performance measures is a totally separate issue. It may be recalled that here, as in the case of the survey data, we sought an indicator of internal consistency (not stability) and chose to approach that goal by empirically clustering adjacent months which appear in fact, to be internally consistent. Such an approach recognized from the

outset that a stable performance "period" may be of varying absolute lengths from organization to organization and from one time to another within the same organization. With one or two exceptions, the periods defined by the method outlined displayed moderate to high internal consistency (alpha) coefficients. As might be expected, some variation in the absolute length of performance periods occurs across both sites and measures. Periods range in absolute lengths from one to 11 months. A period generally encompasses three or four months.

The answer to the third question -- whether relationships of survey to performance data are as they should be -- is generally positive. About these correlations several things may be said at the outset:

(1) Overall, significant relationships of survey to performance data occurred more frequently than chance would lead us to expect.

(2) Those relationships which attained statistical significance ranged generally from .25 to .65, which is a quite respectable magnitude, although the correlations varied in strength by plant.

(3) Better -- stronger, more frequent -- relationships were obtained to penultimate (absenteeism) measures than to ultimate (cost performance) measures.

(4) However, the frequency of "reverse" relationships in Plant 2 (that is, instances in which excellance of the human organization went with poorer cost performance) after some consideration, resulted in the elimination of some TVE periods from future analyses of this plant's data.

Based upon these results, we feel confident in pursuing the analyses remaining for Phase I. In the first of these performance measures for the included organizations will be converted to standard scores based on each organization's score distribution for a particular period. The separate organizational files will then be merged into a single large file containing hundreds of groups. For the analyses in relation to total variable expense, as for those for absenteeism, the total sample of groups will be randomly divided in half. Each half sample will be submitted to multiple regression procedures predicting performance from survey scores. The weights derived from each half will then be applied to the survey scores from the other half, the performance scores predicted, and these predictions compared to actual scores. From this "double cross-validation" procedure, we expect to provide the basis for the value attribution activities in the second phase of the research.

REFERENCES

Bohrnstedt, G.W. A quick method for determining the reliability and validity of multiple-item scales. American Sociological Review, 1969, 34, 542-548.

Bowers, D.G. & Pecorella, P.A. A current value approach to human resources accounting. Accounting Forum, 1975, 45 (2), 25-40.

Brummet, R.L., Pyle, W.C., & Flamholtz, E.G. Accounting for human resources. Michigan Business Review, March 1968, 20-25.

Flamholtz, E.G. The theory and measurement of an individual's value to an organization. Doctoral dissertation, The University of Michigan, Ann Arbor, Michigan: University Microfilms, 1969, No. 70-14, 519.

Guttman, L. A general nonmetric technique for finding the smallest coordinate space for a configuration of points. Psychometrika, 1968, 33, 469-506.

Hermanson, R.H. Accounting for human assets. East Lansing, Michigan: Bureau of Business and Economic Research, 1964.

Likert, R. The human organization. New York: McGraw-Hill, 1967.

Likert, R. Human resource accounting: Building and assessing productive organizations. Personnel, 1973, 8-24.

Likert, R. & Bowers, D.G. Organizational theory and human resource accounting. American Psychologist, 1969, 24 (6), 585-592.

Likert, R., Bowers, D.G., & Norman, R.M. How to increase a firm's lead time in recognizing and dealing with problems of managing its human organization. Michigan Business Review, January, 1969, 12-17.

Likert, R. & Bowers, D.G. Improving the accuracy of P/L reports by estimating the change in dollar value of the human organization. Michigan Business Review, March 1973, 15-24.

Lingoes, J.C. An IBM-7090 program for Guttman-Lingoes smallest space analysis-1. Behavioral Science, 1965, 10, 183-184.

Lingoes, J.C. & Guttman, L. Nonmetric factor analysis: A rank reducing alternative to linear factor analysis. Multivariate Behavioral Research, 1967, 2, 485-505.

Lingoes, J.C. & Roskam, E. A mathematical and empirical study of two multidimensional scaling algorithms. Michigan Mathematical Psychology Program, 1971, 1, 1-69.

Napior, D. No metric multidimensional techniques for summated ratings. In Romney, A.K., Shepard, R.N., and Nerlove, S.B. (eds.), Multidimensional scaling: Theory and applications in the behavioral sciences. New York: Seminar Press, 1972.

Pecorella, P.A. & Bowers, D.G. Future performance trend indicators: A current value approach to human resources accounting - Report I. Technical Report to the Office of Naval Research, September, 1976.

Pyle, W.C. Human resources accounting. Financial Analysts Journal, Sept.-Oct. 1970a, 69-78.

Pyle, W.C. Monitoring human resources--on line. Michigan Business Review, 1970b, 22 (4), 19-32.

Roskam, E. & Lingoes, J.C. U.C. MINISSA-1: A FORTRAN IV (G) program for the smallest space analysis of square symetric matrices. Behavioral Science, 1970, 15, 204-2-5.

Scott, W.A. Measures of test homogeneity. Educational and Psychological Measurement, 1960, 20, 751-757.

Shepard, R.N. Introduction to volume I. In Romney, A.K., Shepard, R.N., and Nerlove, S.B. (eds.), Multidimensional scaling: Theory and applications in the behavioral sciences. New York: Seminar Press, 1972.

Taylor, J.C. & Bowers, D.G. Survey of organizations. Ann Arbor, Michigan: Institute for Social Research, 1972 (revised edition).

APPENDIX A:

Performance Months: Descriptive Statistics by Piant

DESCRIPTIVE MEASURES <1> PLANT:1

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV
4.ABS1-NOV	1	3.0250	3.0250	3.0250	
5.ABS2-DEC	1	3.1860	3.1860	3.1860	
6.ABS3-JAN	1	2.8940	2.8940	2.8940	
7.ABS4-FEB	1	3.2420	3.2420	3.2420	
8.ABS5-MAR	1	2.8280	2.8280	2.8280	
9.ABS6-APR	1	2.4190	2.4190	2.4190	
10.ABS7-MAY	1	2.8030	2.8030	2.8030	
11.ABS8-JUN	1	1.9690	1.9690	1.9690	
12.ABS9-JUL	1	1.4670	1.4670	1.4670	
13.ABS10-AU	1	1.6470	1.6470	1.6470	
14.ABS11-SE	1	1.6720	1.6720	1.6720	
15.TVE1-NOV	62	78.900	173.50	101.20	17.168
16.TVE2-DEC	62	56.333	175.25	88.161	23.271
17.TVE3-JAN	62	70.033	136.70	94.925	9.7057
18.TVE4-FEB	62	80.600	129.80	98.963	11.328
19.TVE5-MAR	62	64.233	118.70	100.14	10.404
20.TVE6-APR	62	81.775	127.60	99.311	12.271
21.TVE7-MAY	62	61.300	173.30	106.98	16.256
22.TVE8-JUN	62	74.500	184.50	103.55	13.691
23.TVE9-JUL	62	79.500	218.50	104.15	18.012
24.TVE10-AU	62	66.000	182.73	107.24	26.193
25.TVE11-SE	62	61.000	151.60	104.01	18.230
26.TVE1-OCT	62	60.400	165.00	101.61	14.057
27.TVE2-NOV	62	62.900	168.10	94.616	13.665
28.TVE3-DEC	62	55.700	154.80	91.924	20.867
29.TVE4-JAN	59	78.633	111.45	89.409	8.5748
30.TVE5-FEB	59	56.467	289.82	113.71	61.421
31.TVE6-MAR	59	52.000	138.50	98.945	14.645
32.TVE7-APR	59	70.250	182.52	104.56	31.321
33.TVE8-MAY	59	75.900	294.70	109.00	41.598
34.TVE9-JUN	59	81.100	160.95	115.58	21.619
35.TVE1-JUL	62	77.300	141.20	99.728	13.026
36.TVE2-AUG	62	76.900	135.60	98.458	12.436
37.TVE3-SEP	62	77.000	128.00	102.14	11.575
38.TVE4-OCT	62	59.300	137.20	99.330	20.450
39.TVE5-NOV	62	77.140	136.60	106.05	15.734

40.TVE6-DEC	62	30.100	189.03	117.10	29.967
41.TVE7-JAN	58	66.900	159.77	110.25	22.599
42.TVE8-FEB	58	55.900	123.67	101.26	12.641
43.TVE9-MAR	58	0.	195.40	96.441	25.902
44.TVE10-AP	50	59.900	104.90	96.961	8.2417
45.TVE11-MA	51	64.900	110.90	97.019	7.9025
46.TVE12-JU	51	60.400	131.60	100.14	9.1257
47.TVE13-JU	58	64.600	118.32	96.473	9.1659
48.TVE14-AU	58	64.500	110.50	96.446	8.4462

DESCRIPTIVE MEASURES <2> PLANT:2

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV
4.AHS1-NOV	42	80.000	85.000	80.680	1.6239
5.AHS2-DEC	42	80.000	85.000	80.714	1.7708
6.AHS3-JAN	42	80.000	85.000	80.760	1.4063
7.AHS4-FEB	42	80.000	85.000	81.559	1.9811
8.AHS5-MAR	42	80.000	85.000	80.204	.79347
9.AHS6-APR	42	80.000	85.000	80.264	.86805
10.AHS7-MAY	42	80.000	85.000	80.204	.79347
11.AHS8-JUN	42	80.000	85.000	80.019	1.8619
12.AHS9-JUL	0				
13.AHS10-AU	0				
14.AHS11-SE	42	40.000	85.000	80.403	6.6690
15.TVE1-NOV	41	66.267	141.05	91.524	14.344
16.TVE2-DEC	41	48.200	146.60	91.743	28.400
17.TVE3-JAN	42	50.000	302.75	126.61	75.152
18.TVE4-FEB	42	47.200	113.29	89.610	10.602
19.TVE5-MAR	42	81.000	230.65	103.90	24.287
20.TVE6-APR	42	30.200	137.81	93.864	15.915
21.TVE7-MAY	42	30.000	158.37	94.825	19.954
22.TVE8-JUN	42	68.550	133.78	104.13	17.232
23.TVE9-JUL	41	38.900	106.10	88.719	14.882
24.TVE10-AU	42	44.600	104.95	87.530	14.145
25.TVE11-SE	42	23.600	106.80	87.436	17.193
26.TVE1-OCT	41	49.300	111.60	86.206	15.682

27.TVE2-NOV	41	56.800	107.77	86.223	16.306
28.TVE3-DEC	41	50.250	128.27	85.742	18.875
29.TVE4-JAN	41	54.000	111.40	84.467	12.923
30.TVE5-FEB	41	0.	138.90	99.257	24.601
31.TVE6-MAR	41	0.	120.90	93.569	17.994
32.TVE7-APR	41	0.	122.77	90.792	20.614
33.TVE8-MAY	41	0.	111.00	90.569	17.755
34.TVE9-JUN	41	0.	148.60	105.62	25.902
35.TVE1-JUL	35	0.	108.10	84.572	17.987
36.TVE2-AUG	35	0.	117.00	91.962	23.765
37.TVE3-SEP	35	0.	5000.4	237.83	829.12
38.TVE4-OCT	35	0.	130.03	95.954	24.849
39.TVE5-NOV	35	0.	137.70	98.052	28.129
40.TVE6-DEC	35	0.	119.70	92.124	19.990
41.TVE7-JAN	33	56.050	108.42	94.786	9.6263
42.TVE8-FEB	33	71.600	101.00	85.560	10.124
43.TVE9-MAR	32	60.850	98.600	86.819	9.5757
44.TVE10-AP	32	70.750	100.87	90.748	6.2268
45.TVE11-MA	33	30.937	5050.4	240.62	863.47
46.TVE12-JU	33	70.817	115.80	90.954	10.389
47.TVE13-JU	33	66.133	118.80	86.231	12.851
48.TVE14-AU	33	78.750	122.90	91.399	9.3008

DESCRIPTIVE MEASURES <3> PLANT:3

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV
4.ABS1-NOV	94	80.000	90.000	81.000	2.9228
5.ABS2-DEC	94	80.000	90.000	81.516	3.4239
6.ABS3-JAN	94	80.000	90.000	81.277	3.1907
7.ABS4-FEB	94	80.000	90.000	81.489	3.4258
8.ABS5-MAR	94	80.000	90.000	82.972	4.4292
9.ABS6-APR	94	80.000	90.000	82.793	4.3665
10.ABS7-MAY	94	80.000	90.000	81.649	3.6763
11.ABSP-JUN	94	80.000	90.000	82.181	3.9695
12.ABS9-JUL	0				
13.ABS10-AU	0				
14.ABS11-SE	94	80.000	90.000	81.348	3.3626

15.TVE1-NOV	89	62.000	9999.8	216.01	1049.2
16.TVE2-DEC	87	0.	1207.1	156.17	258.31
17.TVE3-JAN	88	67.600	1342.3	171.24	289.19
18.TVE4-FEB	89	58.700	138.00	98.711	10.317
19.TVE5-MAR	88	58.000	120.70	101.12	9.4733
20.TVE6-APR	98	56.200	4347.2	340.56	989.07
21.TVE7-MAY	84	63.900	2897.3	259.05	651.30
22.TVE8-JUN	43	66.900	125.90	99.714	10.013
23.TVE9-JUL	38	30.578	134.30	99.101	19.598
24.TVE10-AU	89	46.550	141.80	101.46	18.023
25.TVE11-SE	39	47.600	124.30	102.49	12.055
26.TVE1-OCT	93	54.200	1199.7	161.68	249.11
27.TVE2-NOV	93	60.800	1339.8	171.48	280.27
28.TVE3-DEC	94	44.400	1570.0	182.98	331.49
29.TVE4-JAN	39	43.900	306.00	100.01	26.357
30.TVE5-FEB	39	64.500	315.40	100.68	27.404
31.TVE6-MAR	99	40.400	314.90	98.974	27.221
32.TVE7-APR	88	57.000	339.70	96.701	30.463
33.TVE8-MAY	89	64.900	334.80	100.51	29.254
34.TVE9-JUN	89	46.200	995.40	110.36	99.571
35.TVE1-JUL	87	41.500	180.30	100.37	19.466
36.TVE2-AUG	87	62.400	222.00	106.87	21.738
37.TVE3-SEP	83	54.400	222.00	106.78	21.988
38.TVE4-OCT	88	60.000	161.60	104.77	20.175
39.TVE5-NOV	87	69.100	144.60	103.80	19.213
40.TVE6-DEC	87	50.000	182.20	104.90	24.990
41.TVE7-JAN	86	44.800	160.50	103.53	11.827
42.TVE8-FEB	85	78.400	163.00	98.587	14.496
43.TVE9-MAR	86	32.900	186.10	101.72	16.271
44.TVE10-AP	86	50.000	175.00	101.64	18.402
45.TVE11-MA	86	70.400	184.90	104.51	17.879
46.TVE12-JU	96	31.500	195.40	102.53	31.265
47.TVE13-JU	90	10.600	147.00	98.151	24.001
48.TVE14-AU	96	35.900	180.50	104.75	22.936

APPENDIX B:

Performance Months: Intercorrelations by Plant

Plant I

		VAR	15	16	17	18	19	20	21	22	23	24
TVE2-DEC'65	M	16	0.5493									
TVE3-JAN'66	M	17	0.2539	0.4021								
TVE4-FEB'66	M	18	-0.3241	-0.4295	-0.2134							
TVE5-MARCH'66	M	19	0.1792	0.2127	0.5335	-0.3223						
TVE6-APRIL'66	M	20	-0.1215	-0.2042	0.0761	0.2911	0.4155					
TVE7-MAY'66	M	21	0.2416	0.0842	0.2703	0.1909	0.4329	0.4410				
TVE8-JUNE'66	M	22	-0.1281	-0.1061	0.2630	0.1676	0.0972	0.2494	0.4843			
TVE9-JULY'66	M	23	-0.2424	-0.3332	0.0783	0.2686	0.1848	0.4181	0.6010	0.8360		
TVE10-AUG'66	M	24	-0.3027	-0.3123	-0.5137	0.6688	-0.6020	0.1551	0.2166	0.4465	0.4268	
TVE11-SEPT'66	M	25	-0.1355	0.3096	0.1175	0.0559	0.3086	0.4123	0.5906	0.5505	0.4735	0.3270
TVE1-OCT'66	M	26	-0.1808	-0.3036	-0.0015	0.0830	0.0934	0.2736	0.3222	0.6161	0.6810	0.3025
TVE2-NOV'66	M	27	-0.0695	-0.0426	0.2279	-0.1358	0.3984	0.3863	0.6754	0.7302	0.7775	0.1727
TVE3-DEC'66	M	28	-0.1795	-0.2176	0.0338	-0.2789	0.2079	-0.1568	0.0957	0.2325	0.2370	-0.0498
TVE4-JAN'67	M	29	0.2578	0.1704	0.1672	-0.5151	0.1337	-0.0794	0.0867	0.1322	0.0363	-0.1658
TVE5-FEB'67	M	30	-0.0030	0.0874	0.2208	-0.1928	0.1881	0.0067	0.4307	0.1001	0.1503	-0.0634
TVE6-MARCH'67	M	31	0.2836	0.0945	-0.2229	0.0081	-0.2634	0.0859	0.2168	0.1063	0.0476	0.3903
TVE7-APRIL'67	M	32	-0.0180	-0.0399	0.2298	-0.0509	0.1306	-0.4711	-0.0566	-0.0199	0.0332	-0.3102
TVE8-MAY'67	M	33	0.8588	0.4105	-0.0459	-0.0801	-0.0497	0.0221	0.3108	-0.1767	-0.2048	0.0447
TVE9-JUNE'67	M	34	-0.1142	-0.2414	-0.0110	0.3308	-0.1823	-0.3362	-0.0634	0.0900	0.1231	0.0937
TVE1-JULY'67	M	35	0.3653	0.0315	0.1808	0.3730	-0.0849	0.3395	0.2994	0.1313	0.0130	0.2155
TVE2-AUG'67	M	36	0.4420	0.2151	0.2943	0.1243	0.0906	0.3446	0.1617	0.0010	-0.1733	-0.0288
TVE3-SEPT'67	M	37	0.2098	0.0832	0.1029	0.4477	-0.2066	-0.1045	0.2181	-0.0615	-0.1667	0.1932
TVE4-OCT'67	M	38	0.4895	0.3957	0.2200	-0.4532	0.4749	0.2069	0.4038	-0.0175	-0.0438	-0.3044
TVE5-NOV'67	M	39	0.3262	0.2363	0.0619	-0.2249	0.2241	-0.3885	0.1916	-0.2406	-0.1861	-0.3233
TVE6-DEC'67	M	40	0.0304	0.0448	0.0347	-0.0257	0.0617	-0.5276	0.0042	-0.1461	-0.0822	-0.2035
TVE7-JAN'68	M	41	-0.1159	0.0131	0.0829	-0.1191	0.1098	-0.5307	-0.1559	0.0001	-0.0309	-0.2518
TVE8-FEB'68	M	42	-0.1465	0.1071	-0.0255	0.0088	0.1044	0.0155	0.1948	0.2267	0.1244	0.1432
TVE9-MAR'68	M	43	-0.1480	0.1082	-0.0500	0.1572	-0.1074	-0.0227	0.0681	0.2329	0.2893	0.1832
TVE10-APR'68	M	44	-0.1483	0.0593	-0.1636	0.2375	-0.1501	-0.0626	-0.1403	-0.0026	-0.1589	0.1929
TVE11-MAY'68	M	45	-0.0943	-0.0326	-0.2479	0.1695	-0.1235	-0.0338	-0.2704	-0.2763	-0.2516	0.0523
TVE12-JUNE'68	M	46	-0.2653	-0.3954	-0.3872	0.2252	-0.2556	0.1798	-0.1394	0.1614	0.3660	0.3146
TVE13-JULY'68	M	47	-0.1430	0.0686	-0.1348	0.2029	-0.1718	.1565	-0.1764	-0.2653	-0.1615	0.1014
TVE14-AUG'68	M	48	-0.1094	0.0332	-0.0767	0.2349	-0.0623	-0.0367	0.0530	-0.1360	-0.0991	0.0902

		VAR	26	27	28	29	30	31	32	33	34	35
OTVE2-NOV'66	M	27	0.5723									
OTVE3-DEC'66	M	28	0.2400	0.3997								
OTVE4-JAN'67	M	29	0.2351	0.3098	0.1673							
OTVE5-FEB'67	M	30	-0.2218	0.4346	0.3519	0.2192						
OTVE6-MARCH'67	M	31	-0.0176	0.1490	0.0769	0.4325	0.2391					
OTVE7-APRIL'67	M	32	-0.0947	-0.0628	0.3576	-0.2859	0.0643	-0.3528				
OTVE8-MAY'67	M	33	-0.1234	-0.0724	-0.2737	0.1717	-0.0178	0.5552	-0.1123			
OTVE9-JUNE'67	M	34	0.0810	-0.1319	0.2539	-0.4283	-0.1702	-0.1579	0.8051	-0.0381		
OTVE1-JULY'67	M	35	-0.1752	-0.0923	-0.4666	0.0939	0.0363	0.3515	-0.5080	0.3679	-0.2554	
OTVE2-AUG'67	M	36	-0.0966	-0.1235	-0.3955	0.2727	-0.2712	0.1508	-0.4898	0.4525	-0.2843	0.8119
OTVE3-SEPT'67	M	37	-0.2456	-0.2805	-0.2864	-0.2515	0.1231	0.1254	0.1817	0.2985	0.4281	0.5886
OTVE4-OCT'67	M	38	-0.1034	0.3734	0.0225	0.5526	0.5361	0.3062	-0.4032	0.3219	-0.6565	0.3353
OTVE5-NOV'67	M	39	-0.2771	0.0751	0.1743	0.0915	0.5614	-0.0013	0.5560	0.2494	0.2825	-0.1160
OTVE6-DEC'67	M	40	-0.1838	-0.0969	0.3171	-0.3277	0.2245	-0.2786	0.8993	0.0498	0.7382	-0.4246
OTVE7-JAN'68	M	41	-0.1934	-0.0391	0.3612	-0.2390	0.2202	-0.4891	0.8636	-0.2336	0.6577	-0.5068
OTVE8-FEB'68	M	42	-0.1084	0.3233	0.1358	0.1197	0.5398	0.0110	-0.1602	-0.1471	-0.2184	0.1097
OTVE9-MAR'68	M	43	0.0732	0.0368	-0.5476	-0.1442	0.0363	-0.1997	0.1528	-0.1427	0.2551	0.0288
OTVE10-APR'68	M	44	-0.1231	-0.1056	-0.2486	-0.1657	0.0942	-0.1750	0.1806	-0.0361	0.1900	0.0507
OTVE11-MAY'68	M	45	-0.2320	-0.2365	0.0273	-0.2501	0.0655	-0.0661	0.1244	0.0066	0.0622	-0.0864
OTVE12-JUNE'68	M	46	0.0801	0.0852	-0.1360	0.0422	-0.0166	0.2224	0.0725	-0.0706	0.2245	0.0437
OTVE13-JULY'68	M	47	-0.3035	-0.1023	-0.3126	-0.0786	0.0470	-0.1142	-0.1065	-0.0142	-0.1762	-0.0281
OTVE14-AUG'68	M	48	-0.4116	-0.0557	-0.0329	-0.2943	0.2038	-0.1801	0.2662	0.0129	0.2016	-0.0020

*** OUTPUT CORRELATION MATRIX ***		VAR	37	38	39	40	41	42	43	44	45	46
OTVE4-OCT'67	M	38	-0.0303									
OTVE5-NOV'67	M	39	0.3247	0.4046								
OTVE6-DEC'67	M	40	0.2926	-0.2521	0.7149							
OTVE7-JAN'68	M	41	0.1100	-0.3005	0.4917	0.8427						
OTVE8-FEB'68	M	42	0.1743	0.4175	0.3276	0.0762	0.2685					
OTVE9-MAR'68	M	43	0.1919	-0.0787	0.1555	0.1437	0.0656	0.2464				
OTVE10-APR'68	M	44	0.2181	-0.0322	0.2488	0.3248	0.6722	0.6650	0.3797			
OTVE11-MAY'68	M	45	-0.0381	-0.0370	0.1957	0.2283	0.3438	0.3663	-0.1371	0.7458		
OTVE12-JUNE'68	M	46	-0.0376	-0.2383	-0.1273	-0.1036	0.1543	0.1622	0.3304	0.4987	0.4086	
OTVE13-JULY'68	M	47	-0.1095	-0.0933	-0.1314	-0.1009	0.1729	0.2698	-0.1176	0.5354	0.4363	0.3572
OTVE14-AUG'68	M	48	0.2267	-0.0704	0.3141	0.3095	0.3849	0.4783	0.1057	0.6976	0.6549	0.4381

Plant 2

1 FOR INPUT TO MINISSA TVE2 ONE PLANT ONLY (SEE LABEL)

0*** OUTPUT CORRELATION MATRIX ***

-		VAR	15	16	17	18	19	20	21	22	23	24
OTVE2-DEC'65	M	16	-0.6748									
OTVE3-JAN'66	M	17	0.1637	-0.3086								
OTVE4-FEB'66	M	18	0.2652	-0.7139	0.1435							
OTVE5-MARCH'66	M	19	0.2106	0.1254	-0.0992	0.0913						
OTVE6-APRIL'66	M	20	-0.2275	-0.1248	-0.0522	0.8139	0.2782					
OTVE7-MAY'66	M	21	0.1842	-0.4850	0.0898	0.8630	0.2208	0.8007				
OTVE8-JUNE'66	M	22	-0.0443	-0.2510	0.7124	0.3672	-0.0275	0.4095	0.4251			
OTVE9-JULY'66	M	23	0.3828	-0.7275	0.3799	0.6537	-0.1262	0.3847	0.5057	0.4140		
OTVE10-AUG'66	M	24	0.4947	-0.5077	0.0551	0.4978	-0.0818	0.3207	0.4722	0.1901	0.8572	
OTVE11-SEPT'66	M	25	0.5795	-0.7022	0.3396	0.7143	0.0045	0.4758	0.5908	0.4032	0.9442	0.8789
OTVE1-OCT'66	M	26	0.2714	-0.4833	0.0166	0.5835	-0.1341	0.3825	0.6460	0.3888	0.6046	0.7470
OTVE2-NOV'66	M	27	0.3860	-0.6848	0.0957	0.6832	-0.2134	0.2985	0.6697	0.3020	0.5985	0.6638
OTVE3-DEC'66	M	28	0.3599	-0.6667	0.2429	0.7538	-0.2684	0.3911	0.7796	0.4893	0.6227	0.5103
OTVE4-JAN'67	M	29	-0.2145	0.3570	-0.2069	-0.6773	-0.0613	-0.5582	-0.4784	-0.5189	-0.4387	-0.0960
OTVE5-FEB'67	M	30	-0.0320	0.6219	0.0878	-0.5721	0.1481	-0.0958	-0.3669	0.1119	-0.4847	-0.2494
OTVE6-MARCH'67	M	31	-0.4026	0.4167	-0.0467	-0.3654	0.2169	0.0376	-0.2361	0.0433	-0.3946	-0.1315
OTVE7-APRIL'67	M	32	-0.6183	0.6425	-0.1253	-0.5456	0.1559	-0.0442	-0.3848	-0.0766	-0.5126	-0.2536
OTVE8-MAY'67	M	33	-0.4182	0.4840	0.0093	-0.5007	0.1501	-0.0889	-0.3062	0.0769	-0.3715	-0.0654
OTVE9-JUNE'67	M	34	-0.2063	0.1357	0.6645	-0.3285	-0.0241	-0.1847	-0.2289	0.5363	0.0374	-0.0580
OTVE1-JULY'67	M	35	-0.1228	0.2346	-0.3334	-0.4626	-0.0225	-0.2946	-0.3212	-0.1873	0.0279	0.3078
OTVE2-AUG'67	M	36	-0.3817	0.5321	-0.4808	-0.6536	0.1015	-0.2403	-0.4331	-0.1785	-0.2802	0.0095
OTVE3-SEPT'67	M	37	0.1225	0.2037	-0.0971	-0.0807	-0.0222	0.0445	-0.1128	0.0515	0.0127	0.0589
OTVE4-OCT'67	M	38	-0.5445	0.6509	-0.3119	-0.6235	0.1413	-0.1078	-0.3435	-0.0012	-0.4639	-0.1379
OTVE5-NOV'67	M	39	-0.5678	0.6333	-0.3670	-0.5974	0.1804	-0.0344	-0.3624	0.0458	-0.4423	-0.1444
OTVE6-DEC'67	M	40	-0.2018	0.2086	-0.1439	-0.3009	0.0568	-0.0424	-0.1021	0.1121	0.0274	0.3498
OTVE7-JAN'68	M	41	-0.1754	-0.0108	0.6734	0.3992	0.2452	0.5491	0.6222	0.6795	0.1128	0.1703
OTVE8-FEB'68	M	42	0.5927	-0.3963	-0.4364	-0.0920	-0.0213	-0.2909	-0.0249	-0.2394	0.6662	0.7887
OTVE9-MAR'68	M	43	0.6983	-0.5561	-0.0995	0.1803	-0.0019	-0.0016	0.2214	0.1675	0.7917	0.8020
OTVE10-APR'68	M	44	0.6967	-0.5645	0.0308	0.2428	0.1298	0.0469	0.2799	0.2446	0.7870	0.7683
OTVE11-MAY'68	M	45	0.1561	0.1760	-0.1018	-0.0577	-0.0304	0.0444	-0.1135	0.0412	0.0259	0.0542
OTVE12-JUNE'68	M	46	-0.0518	0.2938	-0.7920	-0.5480	0.0127	-0.3215	-0.4377	-0.4509	-0.0941	-0.0584
OTVE13-JULY'68	M	47	0.0924	-0.7378	0.0669	0.4957	-0.1401	0.0764	0.3977	0.0106	0.8620	0.6307
OTVE14-AUG'68	M	48	0.5783	-0.5842	-0.1538	0.2342	-0.0950	-0.1205	0.2567	-0.1215	0.6556	0.6259

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1 FOR INPUT TO MINISSA TYPE2 ONE PLANT ONLY (SEE LABEL)

0*** OUTPUT CORRELATION MATRIX ***

-	VAR	26	27	28	29	30	31	32	33	34	35
OTVE2-NOV'66	M	27	0.8752								
OTVE3-DEC'66	M	28	0.7694	0.8631							
OTVE4-JAN'67	M	29	-0.4058	-0.3667	-0.5926						
OTVE5-FEB'67	M	30	-0.2352	-0.3612	-0.5611	0.5298					
OTVE6-MARCH'67	M	31	-0.0403	-0.0647	-0.3960	0.3575	0.8341				
OTVE7-APRIL'67	M	32	-0.2381	-0.3357	-0.5929	0.5018	0.9300	0.9131			
OTVE8-MAY'67	M	33	-0.0210	-0.0939	-0.4017	0.4364	0.8908	0.9686	0.9157		
OTVE9-JUNE'67	M	34	-0.0104	-0.0575	-0.1450	0.1283	0.6891	0.6380	0.5978	0.6923	
OTVE1-JULY'67	M	35	0.1395	0.0535	-0.3069	0.5190	0.6606	0.7297	0.7416	0.7750	0.7878
OTVE2-AUG'67	M	36	-0.1395	-0.2541	-0.5528	0.6032	0.8535	0.7926	0.8722	0.8581	0.8171
OTVE3-SEPT'67	M	37	0.0339	0.0811	-0.0099	-0.1054	-0.0046	0.1529	-0.0141	0.1491	-0.0481
OTVE4-OCT'67	M	38	-0.1883	-0.2853	-0.5237	0.5729	0.9497	0.9488	0.9307	0.9105	0.8388
OTVE5-NOV'67	M	39	-0.1782	-0.2294	-0.5256	0.4677	0.9252	0.8584	0.9147	0.9135	0.8237
OTVE6-DEC'67	M	40	0.2521	0.2139	-0.1013	0.3798	0.7004	0.7765	0.7144	0.8301	0.7636
OTVE7-JAN'68	M	41	0.5309	0.4627	0.5286	-0.4171	0.0979	0.0488	-0.0520	0.1183	0.0986
OTVE8-FEB'68	M	42	0.2796	0.2917	0.1487	0.1740	-0.3606	-0.3562	-0.3602	-0.2020	-0.3696
OTVE9-MAR'68	M	43	0.4670	0.4572	0.4246	-0.1007	-0.5681	-0.4581	-0.5493	-0.3657	-0.4409
OTVE10-APR'68	M	44	0.5017	0.4606	0.4408	-0.1660	-0.5329	-0.4117	-0.5662	-0.3322	-0.4573
OTVE11-MAY'68	M	45	0.0932	0.0824	0.0015	-0.1374	-0.0814	0.1834	-0.0968	0.1629	-0.1969
OTVE12-JUNE'68	M	46	-0.3688	-0.4164	-0.5490	0.4282	0.2937	0.2693	0.3631	0.3330	0.2602
OTVE13-JULY'68	M	47	0.6533	0.7008	0.5666	-0.3684	-0.7895	-0.6031	-0.7397	-0.6723	-0.5037
OTVE14-AUG'68	M	48	0.5091	0.4994	0.3422	-0.0453	-0.6026	-0.4656	-0.5178	-0.4590	-0.4267

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FOR INPUT TO MINISSA TYPE2 ONE PLANT ONLY (SEE LABEL)

0*** OUTPUT CORRELATION MATRIX ***

-	VAR	37	38	39	40	41	42	43	44	45	46
OTVE4-OCT'67	M	38	0.0721								
OTVE5-NOV'67	M	39	0.0537	0.9643							
OTVE6-DEC'67	M	40	0.1065	0.8073	0.8008						
OTVE7-JAN'68	M	41	0.0256	0.0904	0.1171	0.3576					
OTVE8-FEB'68	M	42	-0.0809	-0.0958	-0.0600	0.4379	-0.1346				
OTVE9-MAR'68	M	43	-0.2923	-0.3427	-0.2970	0.2606	0.0771	0.7788			
OTVE10-APR'68	M	44	-0.3182	-0.3768	-0.2775	0.3185	0.2161	0.6837	0.9314		
OTVE11-MAY'68	M	45	0.0997	0.0204	-0.0016	0.0985	-0.3625	0.8921	0.7231	0.6132	
OTVE12-JUNE'68	M	46	0.1206	0.5273	0.4859	0.2969	-0.6223	0.4363	-0.0247	-0.2009	0.1139
OTVE13-JULY'68	M	47	0.1544	-0.6100	-0.5984	-0.1325	-0.1262	0.5507	0.4541	0.3559	0.1735
OTVE14-AUG'68	M	48	-0.0697	-0.3996	-0.3642	0.0327	-0.1492	0.6883	0.5676	0.5062	-0.0535

Plant 3

-		VAR	15	16	17	18	19	20	21	22	23	24
OTVE2-DEC'65	M	16	-0.0414									
OTVE3-JAN'66	M	17	0.9529	0.9999								
OTVE4-FEB'66	M	18	-0.0021	-0.1054	-0.1063							
OTVE5-MARCH'66	M	19	-0.0370	-0.1002	-0.0963	0.7170						
OTVE6-APRIL'66	M	20	0.9512	0.9992	0.9997	-0.1196	-0.1147					
OTVE7-MAY'66	M	21	0.9510	0.9990	0.9997	-0.1187	-0.1130	0.9999				
OTVE8-JUNE'66	M	22	0.4198	0.2635	0.7272	0.5778	0.6782	0.6276	0.2935			
OTVE9-JULY'66	M	23	-0.7817	-0.8532	-0.8532	0.3179	0.4704	-0.8600	-0.8594	0.6239		
OTVE10-AUG'66	M	24	-0.1033	-0.7325	-0.7301	0.3810	0.5029	-0.7502	-0.7500	0.7332	0.8906	
OTVE11-SEPT'66	M	25	0.1873	-0.4096	-0.4118	0.5988	0.6880	-0.4215	-0.4221	0.6399	0.6891	0.7234
OTVE1-OCT'66	M	26	0.9552	0.9990	0.9995	-0.1023	-0.0958	0.9995	0.9994	0.6431	-0.8491	-0.7355
OTVE2-NOV'66	M	27	0.9521	0.9989	0.9995	-0.1030	-0.0940	0.9994	0.9994	0.3712	-0.8520	-0.7426
OTVE3-DEC'66	M	28	-0.0047	0.9969	0.9975	-0.0961	-0.0893	0.9975	0.9976	0.1006	-0.8533	-0.7392
OTVE4-JAN'67	M	29	0.0151	0.2397	-0.1010	0.0252	-0.1799	0.4531	0.2368	0.0708	0.0721	-0.0352
OTVE5-FEB'67	M	30	0.0116	0.1639	-0.1809	-0.1173	-0.3673	.3136	0.1269	0.0569	-0.1160	-0.1026
OTVE6-MARCH'67	M	31	-0.4364	0.3366	-0.1683	-0.1597	-0.4677	0.1523	0.1813	-0.1422	-0.0726	0.0189
OTVE7-APRIL'67	M	32	0.3081	0.1301	-0.1045	-0.0547	-0.3711	0.2501	0.2788	-0.0230	-0.1289	-0.0651
OTVE8-MAY'67	M	33	0.3378	0.1933	-0.1244	-0.1083	-0.4084	0.1373	0.1421	-0.0905	-0.0588	0.0268
OTVE9-JUNE'67	M	34	-0.0686	0.0383	-0.0181	-0.0731	-0.0797	-0.0889	-0.0123	-0.0072	-0.0462	0.0354
OTVE1-JULY'67	M	35	0.3017	0.2362	0.0989	0.0238	-0.1245	0.3880	0.2952	0.1758	0.1775	0.1197
OTVE2-AUG'67	M	36	0.2083	0.4514	-0.0145	-0.0304	-0.0809	0.4258	0.0952	0.0964	0.1234	0.1598
OTVE3-SEPT'67	M	37	-0.1490	0.5071	-0.0808	0.0819	-0.0940	0.4950	0.1593	-0.0235	-0.0074	0.0110
OTVE4-OCT'67	M	38	-0.1199	0.2030	-0.1092	-0.0673	-0.3533	0.2299	-0.0132	0.0685	-0.1319	0.0799
OTVE5-NOV'67	M	39	0.2344	0.2007	0.0464	0.0751	-0.2428	0.3046	0.2054	0.0633	-0.0558	0.0530
OTVE6-DEC'67	M	40	0.1862	0.3762	-0.1020	0.1242	-0.1902	0.3188	0.0299	-0.0039	-0.1223	-0.0851
OTVE7-JAN'68	M	41	-0.0577	0.1777	0.0857	0.1823	-0.1348	0.2438	0.2215	0.1353	-0.0564	0.0525
OTVE8-FEB'68	M	42	-0.0551	-0.0070	0.0021	-0.0251	-0.3345	0.1727	0.4108	-0.1507	-0.1863	-0.1402
OTVE9-MAR'68	M	43	-0.0295	-0.0160	0.1317	0.0515	-0.1750	0.3046	0.4886	-0.0553	-0.0375	-0.0739
OTVE10-APR'68	M	44	-0.0068	0.1646	0.1093	0.0107	-0.2181	0.2985	0.4200	0.0458	-0.0855	-0.0630
OTVE11-MAY'68	M	45	-0.0434	0.1166	0.2107	0.1809	-0.0335	0.5038	0.5431	0.1544	0.1447	0.0688
OTVE12-JUNE'68	M	46	-0.0167	0.0309	0.2600	-0.0047	-0.0099	0.3673	0.2109	0.4756	0.2409	0.3955
OTVE13-JULY'69	M	47	-0.0050	0.0816	0.1614	0.1563	-0.0786	0.3952	0.3718	0.1807	0.0182	-0.0206
OTVE14-AUG'68	M	48	-0.0486	0.1424	0.1426	0.0648	-0.2286	0.2911	0.4693	-0.0421	-0.0543	-0.1191

1 FOR INPUT TO MINISSA TYE3 ONE PLANT ONLY (SEE LABEL)

0*** OUTPUT CORRELATION MATRIX ***

-	VAR	26	27	28	29	30	31	32	33	34	35
OTVE2-NOV'66 M	27	0.9990									
OTVE3-DEC'66 M	28	0.9965	0.9985								
OTVE4-JAN'67 M	29	0.0842	-0.0875	-0.1190							
OTVE5-FEB'67 M	30	-0.0124	-0.1809	-0.1478	0.8996						
OTVE6-MARCH'67 M	31	0.0309	-0.1605	-0.1653	0.9059	0.9011					
OTVE7-APRIL'67 M	32	0.0768	-0.1716	-0.1678	0.9202	0.9513	0.9701				
OTVE8-MAY'67 M	33	0.0141	-0.1633	-0.1413	0.8924	0.9492	0.9713	0.9671			
OTVE9-JUNE'67 M	34	0.0161	-0.0549	-0.1097	0.2122	0.2333	0.2698	0.2337	0.2730		
OTVE1-JULY'67 M	35	0.2572	-0.0767	0.0618	0.3248	0.2798	0.3285	0.2719	0.2833	-0.0148	
OTVE2-AUG'67 M	36	0.1740	-0.0963	0.0317	0.3642	0.2847	0.2795	0.2332	0.2706	0.0157	0.7773
OTVE3-SEPT'67 M	37	0.1763	-0.0248	0.1680	0.3051	0.2321	0.2483	0.1818	0.2085	-0.0468	0.7345
OTVE4-OCT'67 M	38	0.3353	-0.1203	-0.0766	0.0338	0.0936	0.1188	0.0862	0.0824	-0.0382	0.6854
OTVE5-NOV'67 M	39	0.2512	-0.0363	0.0759	0.2027	0.2052	0.2580	0.1925	0.2123	-0.0077	0.8300
OTVE6-DEC'67 M	40	0.1606	-0.0228	0.2082	0.2057	0.2188	0.2391	0.1838	0.2358	-0.0529	0.6142
OTVE7-JAN'68 M	41	0.0432	-0.1219	-0.0180	0.1364	0.3523	0.2057	0.1654	0.3610	0.0153	0.3640
OTVE8-FEB'68 M	42	0.0098	-0.1799	-0.0220	0.3814	0.3822	0.5021	0.4298	0.4225	0.0251	0.6905
OTVE9-MAR'68 M	43	0.1909	-0.0648	-0.0648	0.3941	0.3404	0.5473	0.4702	0.4246	0.0567	0.7164
OTVE10-APR'68 M	44	0.1412	-0.1488	-0.0636	0.3301	0.5551	0.5750	0.5244	0.4950	0.0709	0.6645
OTVE11-MAY'68 M	45	0.3426	0.0205	0.0287	0.4816	0.4226	0.5443	0.4991	0.4486	0.0594	0.7869
OTVE12-JUNE'68 M	46	0.0752	-0.2491	-0.2585	0.4533	0.4751	0.4503	0.4917	0.4851	0.0636	0.4887
OTVE13-JULY'68 M	47	0.1769	-0.2053	-0.0535	0.5012	0.5606	0.5458	0.6077	0.5936	0.0693	0.6633
OTVE14-AUG'68 M	48	0.1276	-0.0921	-0.1178	0.5000	0.5709	0.6800	0.6795	0.6912	0.0842	0.7174

1 FOR INPUT TO MINISSA TYE3 ONE PLANT ONLY (SEE LABEL)

0*** OUTPUT CORRELATION MATRIX ***

-	VAR	37	38	39	40	41	42	43	44	45	46
OTVE4-OCT'67 M	38	0.6345									
OTVE5-NOV'67 M	39	0.7505	0.8723								
OTVE6-DEC'67 M	40	0.7372	0.6818	0.8092							
OTVE7-JAN'68 M	41	0.3376	0.4620	0.4937	0.4269						
OTVE8-FEB'68 M	42	0.5279	0.5730	0.6925	0.3621	0.5730					
OTVE9-MAR'68 M	43	0.5694	0.5823	0.7511	0.4783	0.4444	0.8780				
OTVE10-APR'68 M	44	0.4863	0.6172	0.6859	0.4057	0.5830	0.8262	0.8261			
OTVE11-MAY'68 M	45	0.6171	0.6029	0.7566	0.4948	0.4695	0.8258	0.9517	0.8289		
OTVE12-JUNE'68 M	46	0.2792	0.2846	0.3877	0.2860	0.1859	0.2466	0.3808	0.3139	0.4558	
OTVE13-JULY'68 M	47	0.5060	0.6758	0.7165	0.5611	0.4299	0.5497	0.5948	0.6010	0.6415	0.2942
OTVE14-AUG'68 M	48	0.5223	0.5589	0.6936	0.4851	0.4853	0.7670	0.8173	0.7567	0.8018	0.4196

Plants 2 and 3

OUTPUT CORRELATION MATRIX FOR INPUT TO MINISSA ABS ALL PLANTS ***

VAR		4	5	6	7	8	9	10	11
0ABS2-DEC'65	M	5	0.9571						
0ABS3-JAN'66	M	6	0.9409	0.9161					
0ABS4-FEB'66	M	7	0.9516	0.9924	0.9218				
0ABS5-MARCH'66	M	8	0.9788	0.9150	0.9078	0.9062			
0ABS6-APRIL'66	M	9	0.8837	0.9201	0.9127	0.9113	0.9449		
0ABS7-MAY'66	M	10	0.9346	0.9095	0.9979	0.9033	0.8986	0.9043	
0ABS8-JUNE'66	M	11	0.9240	0.9617	0.9834	0.9562	0.9231	0.9291	0.9549
0ABS11-SEPT'66	M	14	0.8445	0.8716	0.8315	0.8522	0.8009	0.8053	0.8034	0.8173

APPENDIX C:

Performance Months: Smallest Space Analyses by Plant

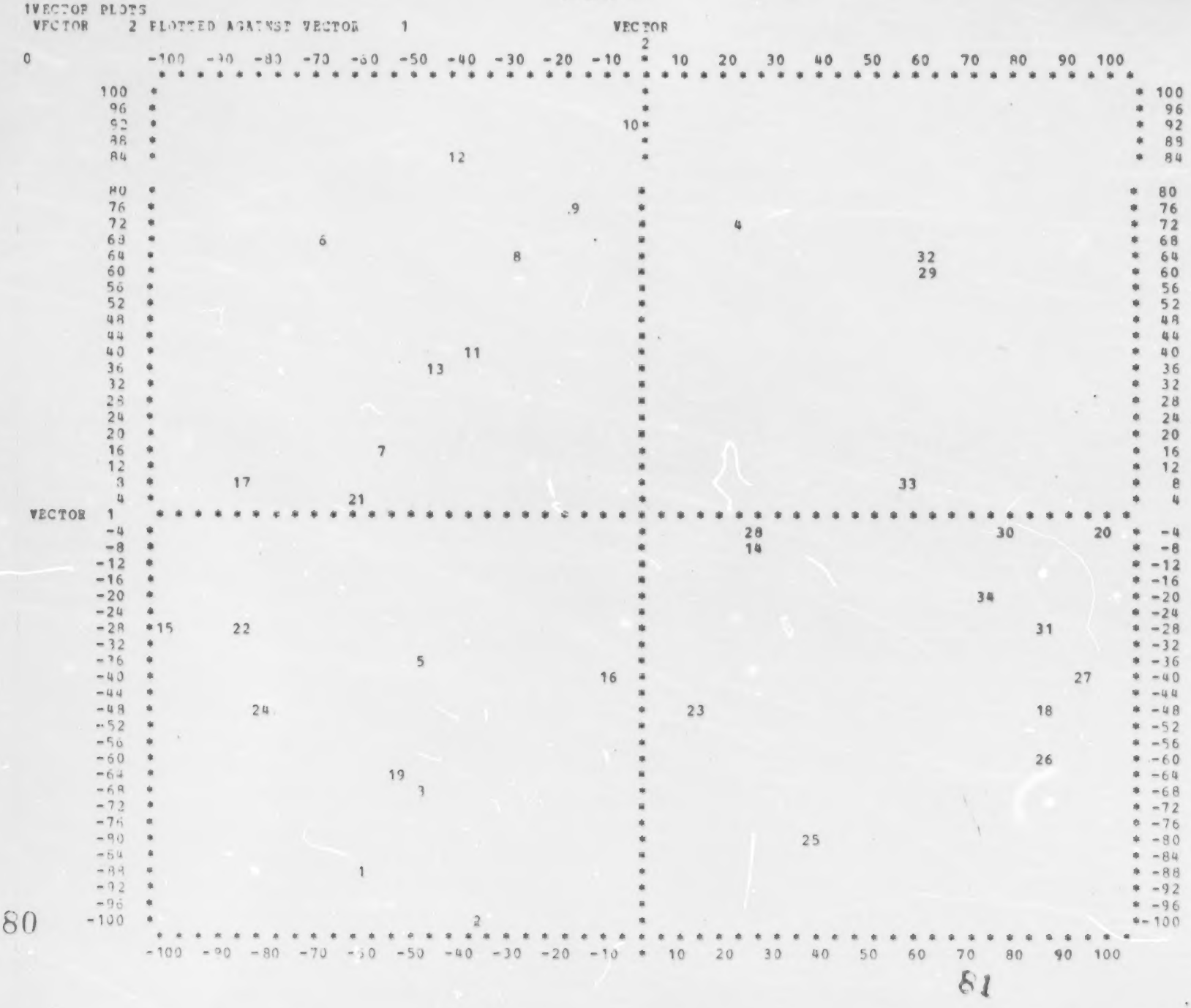
Plant 1

SSA 'Val OLIN CHF PLANT ONLY (SEE LABEL)
GUTTMAN-LINGOFF SMALLEST SPACE COORDINATES FOR S = 3 (SEMI-STRONG MONOTONICITY).

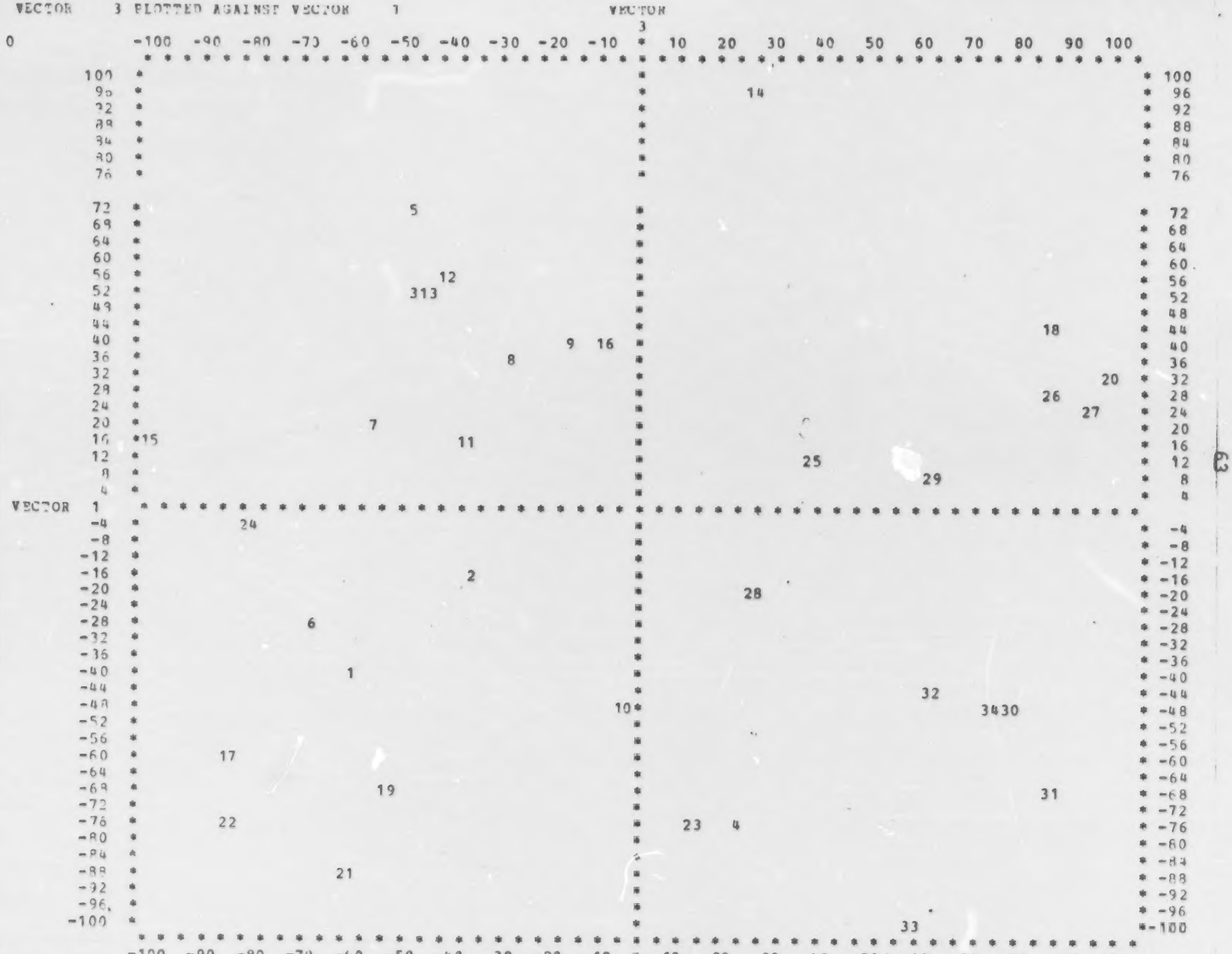
DIMENSION	CENTRALITY INDEX	1	2	3
VARIABLE				
1	104.090	-55.634	-85.980	-34.325
2	101.645	-31.894	-100.000	-16.727
3	95.639	-42.839	-66.333	49.604
4	102.932	23.052	69.274	-76.799
5	94.946	-48.389	-34.952	68.964
6	87.619	-61.893	67.431	-26.943
7	61.019	-50.105	15.921	17.225
8	84.275	-23.232	63.170	35.698
9	90.706	-10.175	73.542	36.717
10	100.635	2.315	88.333	-47.453
11	58.555	-29.265	39.341	15.667
12	112.331	-33.829	82.714	53.316
13	80.734	-38.497	32.976	51.144
14	106.272	24.532	-5.925	95.543
15	106.131	-100.000	-26.013	13.932
16	57.945	-1.013	-39.705	37.666
17	95.628	-79.738	7.760	-57.130
18	108.721	96.779	-47.606	43.597
19	98.640	-48.948	-63.965	-69.470
20	106.269	100.000	-3.054	31.715
21	95.506	-55.077	-0.171	-35.012
22	109.013	-73.162	-25.786	-76.746
23	80.416	12.949	-45.471	-76.370
24	87.544	-74.421	-47.502	-2.012
25	93.905	37.640	-77.763	10.524
26	103.963	84.203	-37.936	25.023
27	102.090	92.039	-40.457	21.981
28	27.304	26.991	-1.151	-17.484
29	98.324	61.110	59.385	5.285
30	88.476	76.672	-1.081	-46.631
31	104.794	85.876	-26.703	-66.226
32	95.493	61.980	50.034	-44.421
33	109.410	59.980	7.457	-100.000
34	84.274	75.669	-18.736	-45.583

GUTTMAN-LINGOFF COEFFICIENT OF ALIENATION = 0.16762 IN 13 ITERATIONS.
KRUSKAL'S STRESS = 0.15477

Plant 1


VECTOR PLOTS
VECTOR 2 PLOTTED AGAINST VECTOR 1
VECTOR 2
VECTOR 1
-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 10 20 30 40 50 60 70 80 90 100
100 96 92 88 84 80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4
-4 -8 -12 -16 -20 -24 -28 -32 -36 -40 -44 -48 -52 -56 -60 -64 -68 -72 -76 -80 -84 -88 -92 -96 -100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

Plant 1


VECTOR 3 PLOTTED AGAINSE VECTOR 1
VECTOR 3
VECTOR 1
-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 10 20 30 40 50 60 70 80 90 100
100 96 92 88 84 80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4
-4 -8 -12 -16 -20 -24 -28 -32 -36 -40 -44 -48 -52 -56 -60 -64 -68 -72 -76 -80 -84 -88 -92 -96 -100
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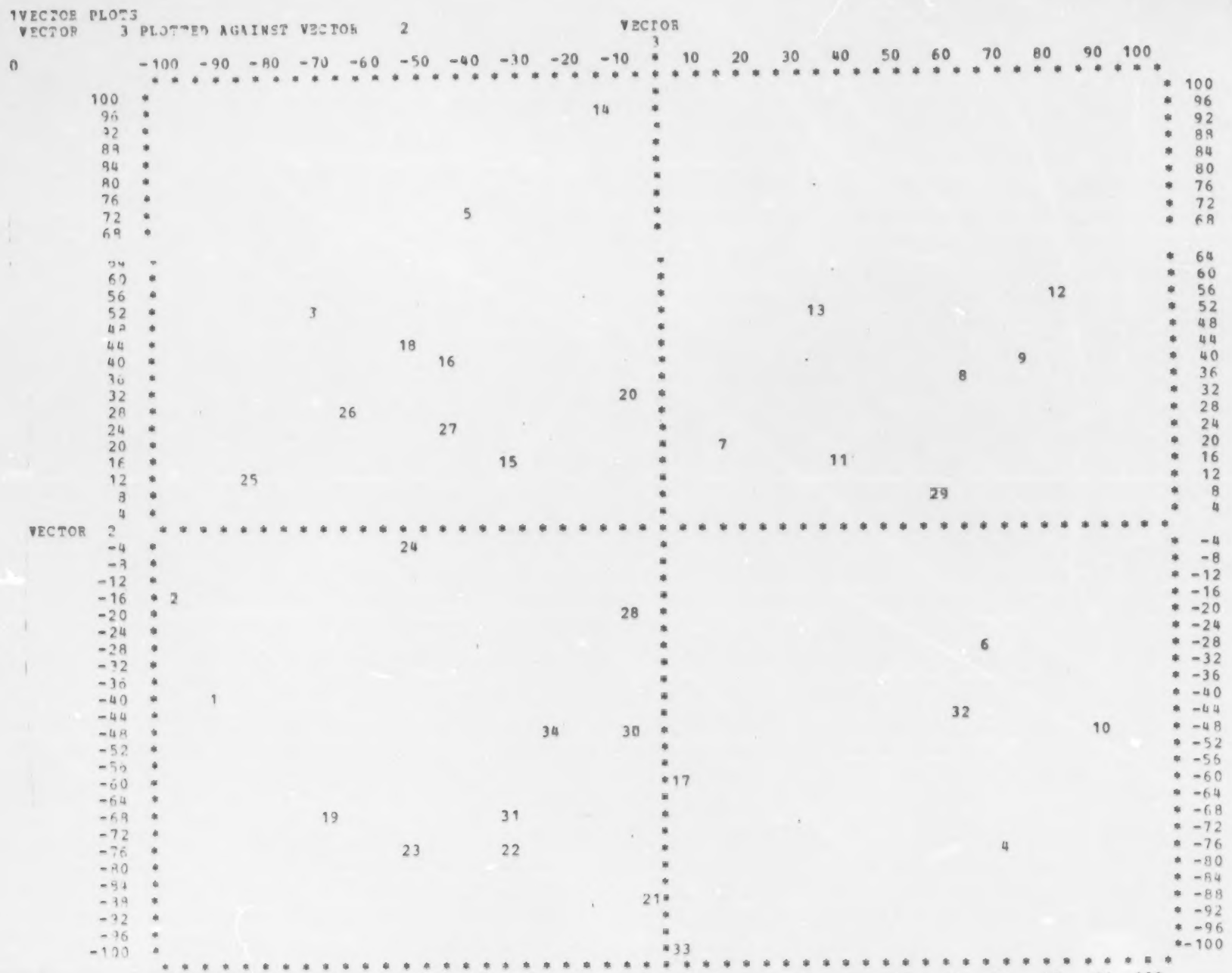
Plant 1


1VECTOR PLOTS
VECTOR 3 PLOTTED AGAINST VECTOR 2
VECTOR 3
VECTOR 2
-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
100 96 92 88 84 80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4 -4 -8 -12 -16 -20 -24 -28 -32 -36 -40 -44 -48 -52 -56 -60 -64 -68 -72 -76 -80 -84 -88 -92 -96 -100
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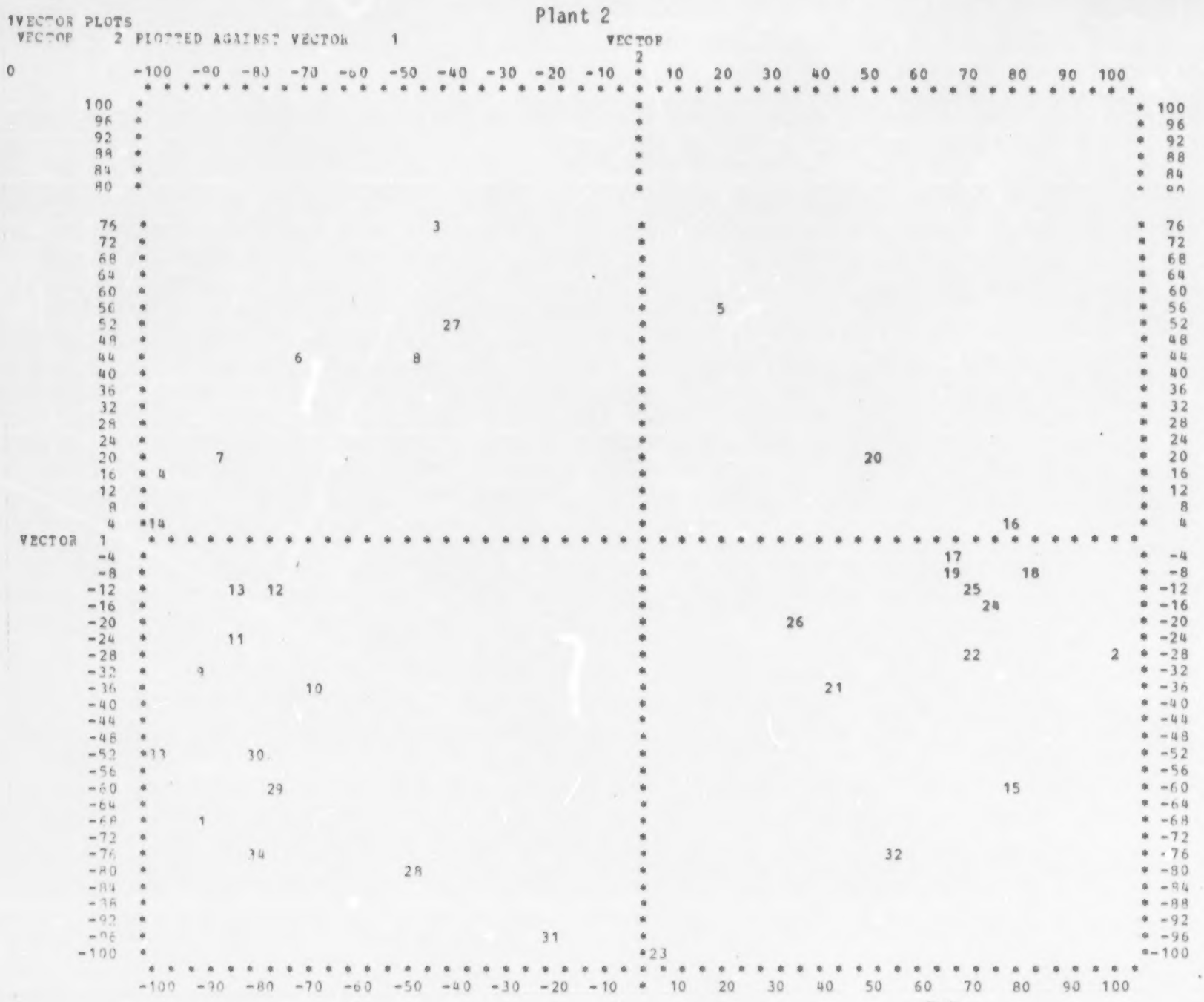
Plant 2

SSA TYPE OLIN ONE PLANT ONLY (SEE LABEL)
GUTTMAN-LINGOFS' SMALLEST SPACE COORDINATES FOR M = 2 (SEMI-STRONG MONOTONICITY).

DIMENSION	CENTRALITY INDEX	1	2
VARIABLE			
1	90.605	-89.729	-68.466
2	112.814	100.000	-26.669
3	95.221	-37.158	74.384
4	98.372	-100.000	15.646
5	80.623	16.719	55.587
6	81.953	-66.262	42.101
7	82.500	-94.954	19.782
8	67.123	-42.104	40.647
9	74.364	-86.068	-30.059
10	54.287	-64.580	-34.716
11	66.974	-79.399	-21.309
12	57.403	-69.214	-11.052
13	67.886	-79.665	-10.072
14	86.664	-96.970	-0.429
15	99.344	77.921	-60.840
16	93.724	77.766	1.454
17	79.284	65.013	-2.665
18	84.273	80.767	-5.443
19	78.376	65.010	-7.609
20	73.174	51.423	16.133
21	59.240	43.261	-36.561
22	81.541	68.644	-28.134
23	92.765	7.094	-100.000
24	86.664	73.333	-13.353
25	84.934	71.796	-9.584
26	45.021	32.564	-20.528
27	72.103	-35.971	48.583
28	68.153	-43.646	-80.167
29	71.387	-70.998	-60.416
30	69.924	-73.980	-50.629
31	76.360	-15.060	-95.890
32	85.414	52.040	-75.583
33	90.989	-87.822	-51.042
34	83.333	-74.430	-75.275

GUTTMAN-LINGOFS' COEFFICIENT OF ALIENATION = 0.16962 IN 15 ITERATIONS.
KRUSKAL'S STRESS = 0.15663


Plant 2
VECTOR PLOTS
VECTOR 2 PLOTTED AGAINST VECTOR 1
VECTOR 2
VECTOR 1
-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 10 20 30 40 50 60 70 80 90 100
100 96 92 88 84 80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4
-4 -8 -12 -16 -20 -24 -28 -32 -36 -40 -44 -48 -52 -56 -60 -64 -68 -72 -76 -80 -84 -88 -92 -96 -100

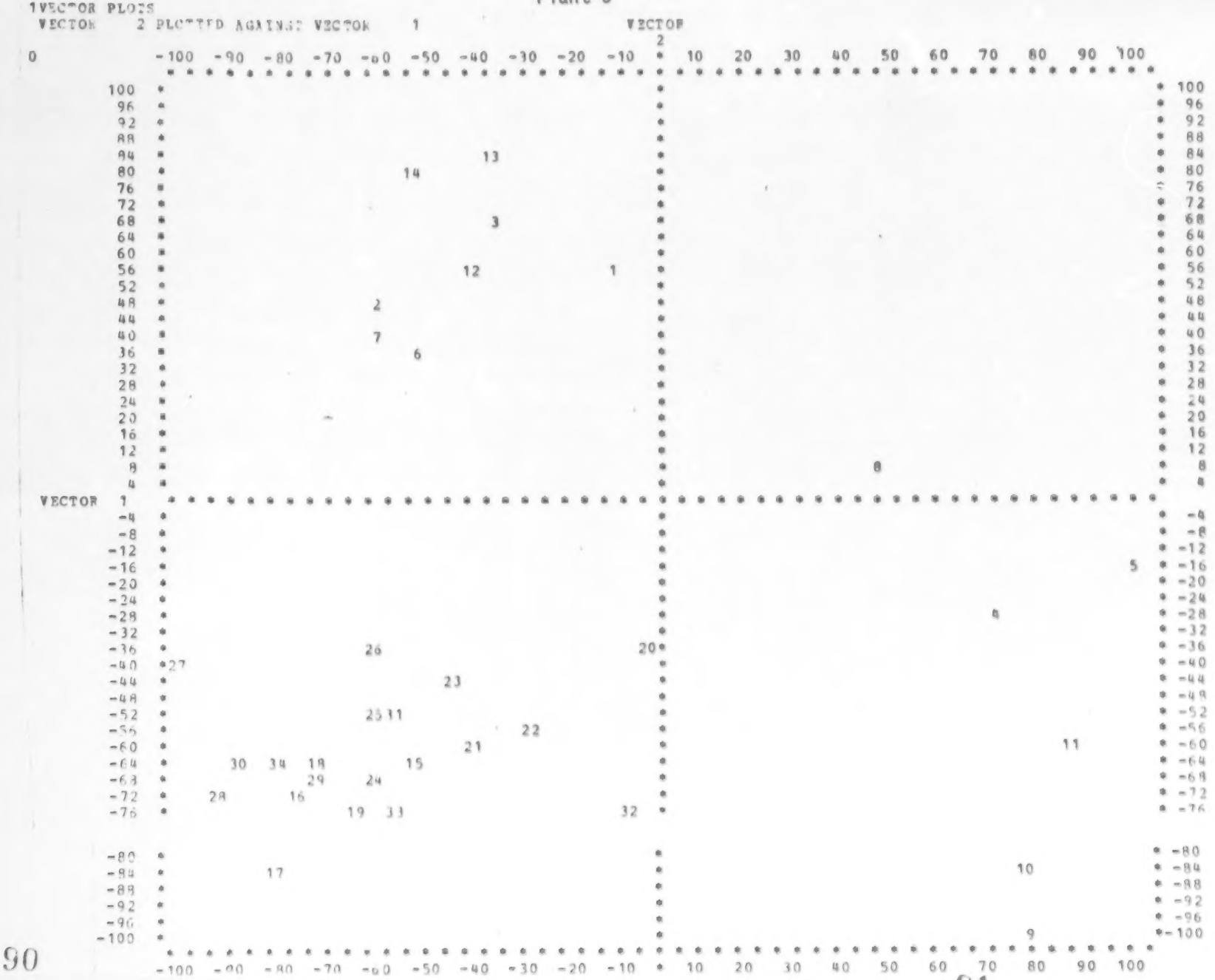
Plant 3

SSA TYPE3 OLIN ONE PLANT ONLY (SEE LABEL)
OGUTTMAN-LINGORS' SMALLEST SPACE COORDINATES FOR M = 3 (SEMI-STRONG MONOTONICITY).

DIMENSION	CENTRALITY INDEX	1	2	3
1	95.565	-5.014	53.261	-29.817
2	83.603	-56.194	47.983	15.052
3	97.527	-31.451	60.764	-3.491
4	107.583	71.670	-27.834	46.784
5	128.881	100.000	-16.040	12.215
6	68.452	-46.115	35.656	2.088
7	74.277	-55.135	39.993	-6.091
8	92.516	46.937	4.060	1.277
9	128.523	79.765	-100.000	7.518
10	117.054	77.000	-81.598	-0.434
11	117.361	84.737	-57.708	23.917
12	83.686	-36.658	52.861	1.114
13	113.384	-29.157	92.773	-2.954
14	110.449	-46.352	77.151	24.516
15	71.080	-47.069	-61.998	-54.395
16	84.192	-72.730	-71.315	-52.019
17	84.013	-74.080	-83.237	-39.797
18	77.764	-68.068	-64.552	-52.004
19	78.522	-60.584	-75.362	-48.703
20	110.489	2.057	-34.602	-100.000
21	43.975	-36.691	-57.890	39.281
22	53.373	-22.481	-53.631	53.891
23	61.451	-40.059	-44.165	64.854
24	70.600	-51.802	-67.459	70.409
25	58.227	-65.598	-52.947	52.175
26	72.787	-53.153	-34.251	74.412
27	82.427	-100.000	-37.426	45.644
28	76.348	-87.618	-72.677	27.848
29	68.737	-68.738	-67.693	25.675
30	66.106	-84.367	-63.957	13.750
31	31.947	-50.651	-50.598	15.739
32	60.960	-2.750	-75.004	-26.535
33	50.832	-50.214	-75.838	8.971
34	57.473	-74.420	-63.664	1.179

OGUTTMAN-LINGORS' COEFFICIENT OF ALIENATION = 0.13911 IN 25 ITERATIONS.
KRUSKAL'S STRESS = 0.12910

Plant 3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VECTOR 2 PLOTTED AGAINST VECTOR 1
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-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 10 20 30 40 50 60 70 80 90 100
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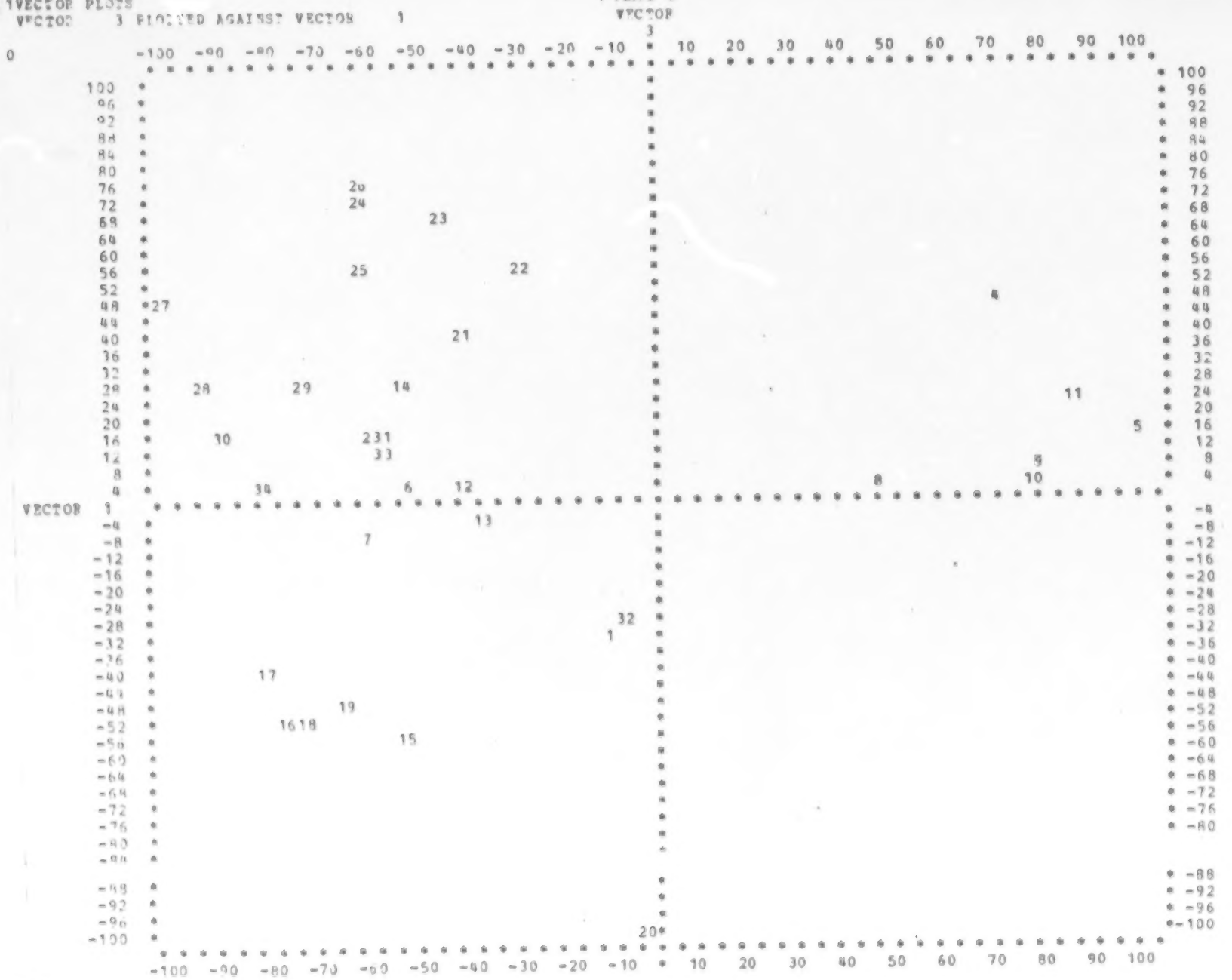
-80 -84 -88 -92 -96 -100


Plant 3
1VECTOR PLOTS
VECTOR 3 PLOTTED AGAINST VECTOR 1
VECTOR
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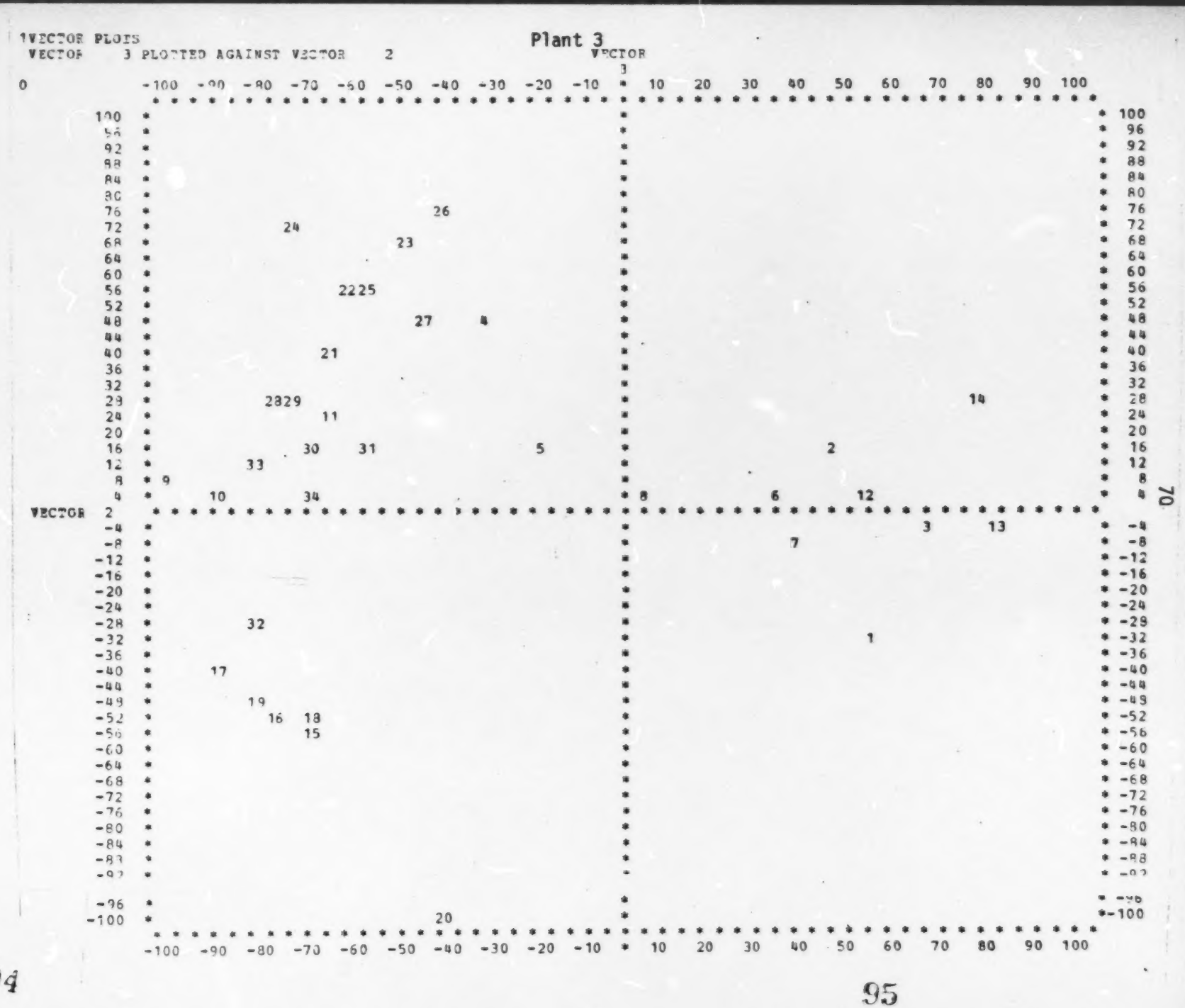
VECTOR 1


1VECTOR PLOTS
VECTOR 3 PLOTTED AGAINST VECTOR 2
Plant 3
VECTOR 3
VECTOR 2
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100 96 92 88 84 80 76 72 68 64 60 56 52 48 44 40 36 32 28 24 20 16 12 8 4
-4 -8 -12 -16 -20 -24 -28 -32 -36 -40 -44 -48 -52 -56 -60 -64 -68 -72 -76 -80 -84 -88 -92 -96 -100
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Plants 2 and 3 Combined

SSA ABS OLIN ALL PLANTS
OGUTMAN-LINGOFS' SMALLEST SPACE COORDINATES FOR M = 1 (SEMI-STRONG MONOTONICITY).
DIMENSION 1

VARIABLE	CENTRALITY INDEX	
1	22.017	-99.555
2	22.055	-99.593
3	22.062	-99.600
4	22.010	-99.548
5	22.462	-100.000
6	22.393	-99.931
7	22.275	-99.813
8	22.223	-99.767
9	177.539	100.000

OGUTMAN-LINGOFS' COEFFICIENT OF ALIENATION = 0.00115 IN 40 ITERATIONS.
KRUSKAL'S STRESS = 0.00104

APPENDIX D:

Performance Periods: Descriptive Statistics by Plant

Plant 1

DESCRIPTIVE MEASURES

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV
3001.TVE1A	62	70.033	136.70	94.925	9.7057
3002.TVE1B	62	80.600	129.80	98.963	11.328
3003.TVE1C	62	81.911	137.83	102.14	10.280
3004.TVE1D	62	67.383	176.70	102.53	13.085
3005.TVE1E	62	67.383	176.70	102.53	13.085
3006.TVE1F	62	55.700	154.80	91.924	20.867
3007.TVE1G	59	78.633	111.45	89.409	8.5748
3008.TVE1H	59	56.467	289.82	113.71	61.421
3009.TVE1I	59	52.000	138.50	98.945	14.645
3010.TVE1J	59	70.250	182.52	104.56	31.321
3011.TVE1K	59	75.900	294.70	109.00	41.598
3012.TVE1L	59	81.100	160.95	115.58	21.619
3013.TVE1M	61	77.317	134.93	99.980	10.687
3060.TVE1N	61	59.300	137.20	99.047	20.497
3061.TVE1O	61	80.600	157.32	110.97	20.563
3062.TVE1P	57	55.900	123.67	101.22	12.749
3063.TVE1Q	57	0.	115.20	94.705	22.471
3064.TVE1R	50	59.900	104.90	96.961	8.2417
3065.TVE1S	57	65.275	111.60	97.539	6.4905
3027.ABSB	0				
3028.ABSC	0				
3030.ABSF	0				

Plant 2

DESCRIPTIVE MEASURES

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV
3001.TVE1A	40	71.350	302.75	129.30	75.865
3002.TVE1B	40	79.900	113.29	90.562	8.4051
3003.TVE1C	40	81.000	230.65	104.69	24.627
3004.TVE1D	40	64.728	117.72	91.134	11.847
3005.TVE1E	40	64.728	117.72	91.134	11.847
3006.TVE1F	0				
3007.TVE1G	0				
3008.TVE1H	0				
3009.TVE1I	40	11.900	116.24	91.836	17.213
3010.TVE1J	0				
3011.TVE1K	0				
3012.TVE1L	0				
3013.TVE1M	34	0.	108.40	91.415	19.744
3060.TVE1N	34	0.	5000.4	241.95	841.23
3061.TVE1O	34	0.	122.77	95.315	23.582
3062.TVE1P	32	56.050	108.42	94.824	9.7778
3063.TVE1Q	31	75.000	100.17	88.291	7.4493
3064.TVE1R	32	70.887	115.80	90.840	10.535
3065.TVE1S	32	73.433	111.62	88.905	10.501
3027.ABSB	40	80.000	84.375	80.096	1.0139
3028.ABSC	40	80.000	84.375	80.096	1.0139
3030.ABSE	40	80.000	85.000	80.423	0.8373

Plant 3

DESCRIPTIVE MEASURES

VARIABLE	N	MINIMUM	MAXIMUM	MEAN	STD DEV
3001.TVE1A	82	0.	1207.1	161.58	268.53
3002.TVE1B	81	67.600	1342.3	177.31	300.79
3003.TVE1C	81	63.350	123.40	99.753	9.2939
3004.TVE1D	81	66.433	3622.3	317.12	853.07
3005.TVE1E	82	52.938	128.37	100.93	15.851
3006.TVE1F	85	59.333	1369.8	179.32	299.69
3007.TVE1G	0				
3008.TVE1H	0				
3009.TVE1I	81	65.560	322.16	100.03	28.072
3010.TVE1J	81	46.200	995.40	112.40	104.09
3011.TVE1K	0				
3012.TVE1L	0				
3013.TVE1M	80	78.427	151.90	104.52	15.689
3060.TVE1N	0				
3061.TVE1O	0				
3062.TVE1P	0				
3063.TVE1Q	0				
3064.TVE1R	78	31.500	195.40	103.32	31.682
3065.TVE1S	73	49.500	149.80	101.73	22.149
3027.ABSB	86	80.000	90.000	81.544	2.6605
3028.ABSC	86	80.000	90.000	81.544	2.6605
3030.ABSE	86	80.000	90.000	81.124	3.0038

APPENDIX E

Performance Periods: Inter-Correlations by Plant

MISSING DATA CORRELATION

Plant 1

3001. TVE1A	1.0000											
3002. TVE1B	-.2145 (62)	1.0000										
3003. TVE1C	.3520 (62)	.1068 (62)	1.0000									
3004. TVE1D	-.0417 (62)	.3177 (62)	.4852 (62)	1.0000								
3005. TVE1E	-.0417 (62)	.3177 (62)	.4852 (62)	1.0000 (62)	1.0000							
3006. TVE1F	.0334 (62)	-.2794 (62)	.0578 (62)	.2126 (62)	.2126 (62)	1.0000						
3007. TVE1G	.1665 (59)	-.5161 (59)	.0580 (59)	.0861 (59)	.0861 (59)	.1671 (59)	1.0000					
3008. TVE1H	.2207 (59)	-.1831 (59)	.2918 (59)	.1577 (59)	.1577 (59)	.3518 (59)	.2191 (59)	1.0000				
3009. TVE1I	-.2238 (59)	.0076 (59)	.0588 (59)	.2174 (59)	.2174 (59)	.0766 (59)	.4322 (59)	.2390 (59)	1.000C			
3010. TVE1J	.2296 (59)	-.0513 (59)	-.1738 (59)	-.1765 (59)	-.1765 (59)	.3575 (59)	-.2864 (59)	.0643 (59)	-.3532 (59)	1.0000		
3011. TVE1K	-.0462 (59)	-.0803 (59)	.1550 (59)	-.1225 (59)	-.1255 (59)	-.2738 (59)	.1715 (59)	-.0179 (59)	.5551 (59)	-.1124 (59)	1.0000	
3012. TVE1L	-.0116 (59)	.3306 (59)	-.2291 (59)	.0169 (59)	.0169 (59)	.2538 (59)	-.4289 (59)	-.1703 (59)	-.1583 (59)	.8051 (59)	-.0383 (59)	1.0000
3013. TVE1M	.2240 (61)	.3630 (61)	.2058 (61)	-.0330 (61)	-.0330 (61)	-.4479 (61)	.0475 (58)	-.0435 (58)	.3284 (58)	-.3298 (58)	.4413 (58)	-.0517 (58)
3060. TVE1N	.2197 (61)	-.4359 (61)	.4544 (61)	.0024 (61)	.0024 (61)	.0223 (61)	.5524 (58)	.5361 (58)	.3060 (58)	-.4095 (58)	.3218 (58)	-.6570 (58)
3061. TVE1O	.0557 (61)	-.1128 (61)	-.1781 (61)	-.2171 (61)	-.2171 (61)	.3186 (61)	-.2186 (58)	.3275 (58)	-.2804 (58)	.8744 (58)	.0079 (58)	.6575 (58)
3062. TVE1P	-.0260 (57)	.0084 (57)	.1430 (57)	.3223 (57)	.3223 (57)	.1356 (57)	.1194 (54)	.5398 (54)	.0107 (54)	-.1605 (54)	-.1473 (54)	-.2188 (54)
3063. TVE1Q	-.0503 (57)	.1570 (57)	-.0164 (57)	.3007 (57)	.3007 (57)	-.5479 (57)	-.1448 (54)	.0361 (54)	-.2002 (54)	.1526 (54)	-.1429 (54)	.2548 (54)
3064. TVE1R	-.1641 (50)	.2373 (50)	-.1563 (50)	.0685 (50)	.0685 (50)	-.2489 (50)	-.1660 (47)	.0941 (47)	-.1752 (47)	.1804 (47)	-.0362 (47)	.1898 (47)
3065. TVE1S	-.2715 (57)	.2667 (57)	-.1082 (57)	.0069 (57)	.0069 (57)	-.1573 (57)	-.1584 (54)	.0960 (54)	.0271 (54)	.0327 (54)	-.0148 (54)	.0306 (54)
	TVE1A	TVE1B	TVE1C	TVE1D	TVE1E	TVE1F	TVE1G	TVE1H	TVE1I	TVE1J	TVE1K	TVE1L

Plant 1

3060. TVE1N	.2413 (61)	1.0000					
3061. TVE1O	-.2650 (61)	-.1309 (61)	1.0000				
3062. TVE1P	.4073 (57)	.4073 (57)	.2166 (57)	1.0000			
3063. TVE1Q	-.0071 (57)	-.1617 (57)	.1517 (57)	.2711 (57)	1.0000		
3064. TVE1R	.0716 (50)	-.0325 (50)	.4549 (50)	.6649 (50)	.3797 (50)	1.0000	
3065. TVE1S	-.0385 (57)	-.0982 (57)	.1216 (57)	.4205 (57)	.1506 (57)	.7751 (50)	1.0000
	3013. TVE1M	3060. TVE1N	3061. TVE1O	3062. TVE1P	3063. TVE1Q	3064. TVE1R	3065. TVE1S

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'MISSING DATA CORRELATION Plant 2

3001. TVE1A	1.0000											
3002. TVE1B	.0590 (40)	1.0000										
3003. TVE1C	-.1275 (40)	.0302 (40)	1.0000									
3004. TVE1D	.2420 (40)	.7611 (40)	-.0922 (40)	1.0000								
3005. TVE1E	.2420 (40)	.7611 (40)	-.0922 (40)	1.0000 (40)	1.0000							
3006. TVE1F	-0.	-0.	-0.	-0.	-0.	1.0000						
3007. TVE1G	-0.	-0.	-0.	-0.	-0.	-0.	1.0000					
3008. TVE1H	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000				
3009. TVE1I	-.0475 (40)	-.5815 (40)	.1456 (40)	-.3900 (40)	-.3900 (40)	-0.	-0.	-0.	1.0000			
3010. TVE1J	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000		
3011. TVE1K	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
3012. TVE1L	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	.0000
3013. TVE1M	-.3231 (34)	-.5348 (34)	.0849 (34)	-.2087 (34)	-.2087 (34)	-0.	-0.	-0.	.9039 (34)	-0.	-0.	-0.
3060. TVE1N	-.0979 (34)	-.0792 (34)	-.0255 (34)	.0429 (34)	.0429 (34)	-0.	-0.	-0.	.0417 (34)	-0.	-0.	-0.
3061. TVE1O	-.3002 (34)	-.5514 (34)	.1419 (34)	-.2338 (34)	-.2338 (34)	-0.	-0.	-0.	.9366 (34)	-0.	-0.	-0.
3062. TVE1P	.6732 (32)	.4014 (32)	.2442 (32)	.5677 (32)	.5677 (32)	-0.	-0.	-0.	-.0433 (32)	-0.	-0.	-0.
3063. TVE1Q	-.3234 (31)	.0375 (31)	.0490 (31)	.3800 (31)	.3800 (31)	-0.	-0.	-0.	-.3980 (31)	-0.	-0.	-0.
3064. TVE1R	-.7918 (32)	-.5539 (32)	.0199 (32)	-.4523 (32)	-.4523 (32)	-0.	-0.	-0.	.3992 (32)	-0.	-0.	-0.
3065. TVE1S	-.0267 (32)	.4089 (32)	-.1206 (32)	.5885 (32)	.5885 (32)	-0.	-0.	-0.	-.6992 (32)	-0.	-0.	-0.
	TVE1A	TVE1B	TVE1C	TVE1D	TVE1E	TVE1F	TVE1G	TVE1H	TVE1I	TVE1J	TVE1K	TVE1L

Plant 2

3060. TVE1N	.0186 (34)	1.0000					
3061. TVE1O	.9238 (34)	.0784 (34)	1.0000				
3062. TVE1P	-.1441 (32)	.0254 (32)	.1750 (32)	1.0000			
3063. TVE1Q	-.0723 (31)	-.2161 (31)	-.1150 (31)	-.1604 (31)	1.0000		
3064. TVE1R	.7134 (32)	.1229 (32)	.5025 (32)	-.6204 (31)	.2161 (31)	1.0000	
3065. TVE1S	-.2168 (32)	.0675 (32)	-.4816 (32)	-.1390 (31)	.6155 (31)	.2904 (32)	1.0000
	TVE1M	TVE1N	TVE1O	TVE1P	TVE1Q	TVE1R	TVE1S

MISSING DATA CORRELATION

VARIABLE	MEAN	STD. DEV.	N	CORR	T-STAT	SIGNIF
3027.ABSB	80.696	1.0139	40	1.0000		
3028.ABSC	80.696	1.0139				
3027.ABSB	80.969	1.0139	40	.1650	1.0313	.3089
3030.ABSE	80.423	6.8373				
3028.ABSC	80.696	1.0139	40	.1650	1.0313	.3080
3030.ABSE	80.423	6.8373				

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MISSING DATA CORRELATION

Plant 3

VARIABLE												
3001.TVE1A	1.0000											
3002.TVE1B	.9939 (81)	1.0000										
3003.TVE1C	-.1113 (81)	-.1097 (81)	1.0000									
3004.TVE1D	.9992 (81)	.9998 (81)	-.1251 (81)	1.0000								
3005.TVE1E	-.7634 (82)	-.7634 (81)	.5367 (81)	-.7720 (81)	1.0000							
3006.TVE1F	.9990 (81)	.9993 (81)	-.1056 (81)	.9993 (81)	-.7621 (81)	1.0000						
3007.TVE1G	-0.	-0.	-0.	-0.	-0.	-0.	1.0000					
3008.TVE1H	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000				
3009.TVE1I	.2775 (77)	-.1328 (76)	-.2209 (76)	.2085 (76)	-.0532 (77)	-.1657 (80)	-0.	-0.	1.0000			
3010.TVE1J	.0386 (77)	-.0154 (76)	-.0767 (76)	-.0437 (76)	-.0081 (77)	-.1002 (80)	-0.	-0.	.2450 (81)	1.0000		
3011.TVE1K	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000	
3012.TVE1L	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	1.0000
3013.TVE1M	.2923 (76)	.0305 (75)	-.0606 (75)	.3011 (75)	.0223 (76)	.1264 (79)	-0.	-0.	.2510 (80)	-.0098 (80)	-0.	-0.
3064.TVE1R	.0432 (76)	.3053 (75)	.0454 (75)	.4498 (75)	.3111 (76)	-.1701 (77)	-0.	-0.	.5432 (78)	.0560 (78)	-0.	-0.
3065.TVE1S	.1436 (71)	.1822 (70)	.0245 (70)	.4037 (70)	-.0464 (71)	-.0405 (72)	-0.	-0.	.7880 (73)	.0756 (73)	-0.	-0.
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	3010. TVE1J	3011. TVE1K	3012. TVE1L

Plot 3

3064.TVEIR	.3983 (78)	
3065.TVEIS	.8436 (73)	.3885 (73)
	TVE M	TVE R

MISSING DATA CORRELATION

VARIABLE	MEAN	STD DEV	N	CORR	T-STAT	SIGNIF
3027.ABSB	81.544	2.6605	86	1.0000		
3028.ABSC	81.544	2.6605				
3027.ABSB	81.544	2.6605	86	.5728	6.4040	.0000
3030.ABSE	81.124	3.0938				
3028.ABSC	81.544	2.6605	86	.5728	6.4040	.0000
3030.ABSE	81.124	3.0938				

APPENDIX F

Correlations Between SOO and Performance by Plant

131.176 SUP	.0156 (55)	-.2228 (55)	-.2004 (55)	-.1123 (55)	-.1123 (55)	-.0949 (55)	.1448 (52)	-.1393 (52)	-.0398 (52)	.0495 (52)	.1666 (52)	.0015 (52)
133.178 SUP	-.0619 (55)	-.0484 (55)	-.2776* (55)	-.0550 (55)	-.0550 (55)	.1850 (55)	.1723 (52)	-.0483 (52)	-.0391 (52)	.0920 (52)	-.0480 (52)	.0922 (52)
135.180 SUP	.0328 (55)	-.0803 (55)	-.2386 (55)	-.0619 (55)	-.0619 (55)	.0481 (55)	.2658* (52)	-.0563 (52)	-.0726 (52)	.1479 (52)	-.0582 (52)	.0721 (52)
137.182 SUP	.0334 (55)	-.2968* (55)	-.2208 (55)	-.1573 (55)	-.1573 (55)	-.0075 (55)	.1115 (52)	-.0476 (52)	-.1477 (52)	.2373 (52)	.0624 (52)	.1041 (52)
139.184 PEER	.1952 (55)	-.2706* (55)	-.1723 (55)	-.2865* (55)	-.2865* (55)	-.0625 (55)	.0649 (52)	-.0802 (52)	-.1718 (52)	.0471 (52)	-.0293 (52)	-.0575 (52)
141.186 PEER	.0857 (55)	-.2214 (55)	-.2599* (55)	-.1977 (55)	-.1977 (55)	.0173 (55)	.2136 (52)	-.1551 (52)	-.1481 (52)	-.0283 (52)	-.0450 (52)	.0172 (52)
143.188 PEER	.0553 (55)	-.1920 (55)	-.2461 (55)	-.2664* (55)	-.2664* (55)	-.1251 (55)	.0578 (52)	-.0661 (52)	-.1425 (52)	.0743 (52)	-.0896 (52)	-.0067 (52)
145.190 PEER	.0552 (55)	-.3046* (55)	-.2220 (55)	-.2982* (55)	-.2982* (55)	-.0792 (55)	.1070 (52)	-.1540 (52)	-.1325 (52)	.0699 (52)	.1001 (52)	.0181 (52)
148.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
151.196 HUM.	.0088 (55)	-.4078** (55)	-.1645 (55)	-.1261 (55)	-.1261 (55)	-.1087 (55)	.4191** (52)	-.0056 (52)	.2990* (52)	-.2482 (52)	.3948** (52)	-.2530 (52)
152.197 COMM	.0178 (55)	-.4387** (55)	-.2754* (55)	-.1890 (55)	-.1890 (55)	.0384 (55)	.3361* (52)	-.0785 (52)	.1111 (52)	-.0412 (52)	.2763* (52)	-.0995 (52)
153.198 MOTI	-.0035 (55)	-.3335* (55)	-.0919 (55)	-.0456 (55)	-.0456 (55)	-.0180 (55)	.2961* (52)	-.0344 (52)	.1234 (52)	-.3484** (52)	.1903 (52)	-.2912* (52)
154.199 DEC.	-.1307 (54)	-.3481** (54)	-.1582 (54)	-.1241 (54)	-.1241 (54)	-.0138 (54)	.2640* (51)	-.0410 (51)	.2811* (51)	-.1532 (51)	.4531** (51)	-.1743 (51)
155.200 SATI	-.3077 (55)	-.3686** (55)	-.1289 (55)	-.0751 (55)	-.0751 (55)	-.0422 (55)	.3127* (52)	-.0090 (52)	.1847 (52)	-.1414 (52)	.2168 (52)	-.1445 (52)
156.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
159.204 LOWE	.0306 (55)	-.3108* (55)	-.2340 (55)	-.2073 (55)	-.2073 (55)	-.0220 (55)	.2728* (52)	.0233 (52)	.2503 (52)	-.0409 (52)	.3305* (52)	-.1003 (52)
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	3010. TVE1J	3011. TVE1K	3012. TVE1L

Plant 1 (SOO Wave 1)

131.176 SUP	-.0530 (54)	-.0197 (54)	-.0293 (54)	-.2725* (50)	-.1154 (50)	-.0699 (44)	-.1423 (50)
133.178 SUP	-.2593 (54)	-.2189 (54)	.0627 (54)	-.1752 (50)	-.1948 (50)	-.0267 (44)	-.0459 (50)
135.180 SUP	-.1468 (54)	-.0645 (54)	.1406 (54)	-.0890 (50)	-.0517 (50)	.0338 (44)	-.0998 (50)
137.182 SUP	-.3019* (54)	-.0362 (54)	.2683* (54)	-.1314 (50)	-.0937 (50)	-.0498 (44)	-.1447 (50)
139.184 PEER	.0270 (54)	-.0421 (54)	.0235 (54)	-.1928 (50)	-.0864 (50)	-.1796 (44)	-.1934 (50)
141.186 PEER	-.0224 (54)	.0027 (54)	.0206 (54)	-.0582 (50)	-.0750 (50)	-.0908 (44)	-.2101 (50)
143.188 PEER	-.0179 (54)	.0185 (54)	.1598 (54)	.0228 (50)	.1244 (50)	-.0322 (44)	-.1513 (50)
145.190 PEER	-.0641 (54)	.0141 (54)	.1848 (54)	-.0781 (50)	.0967 (50)	-.0841 (44)	-.2735* (50)
148.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.
151.196 HUM.	-.0213 (54)	.1594 (54)	-.2397 (54)	-.2589 (50)	-.1649 (50)	-.0681 (44)	-.1408 (50)
152.197 COMM	-.1362 (54)	.0848 (54)	-.0205 (54)	-.2078 (50)	-.2261 (50)	-.0155 (44)	-.1460 (50)
153.198 MOTI	-.0507 (54)	.2027 (54)	-.2463 (54)	-.0031 (50)	-.0828 (50)	-.0660 (44)	-.2048 (50)
154.199 DEC.	-.1041 (53)	.0819 (53)	-.1397 (53)	-.2091 (49)	-.1995 (49)	.0001 (43)	.0394 (49)
155.200 SATI	-.1034 (54)	.1336 (54)	-.1329 (54)	-.2164 (50)	-.0933 (50)	-.1003 (44)	-.2187 (50)
156.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.
159.204 LONE	-.1311 (54)	.0569 (54)	-.0662 (54)	-.2058 (50)	-.1975 (50)	.0492 (44)	.1555 (50)
	3013. TVELM	3060. TVELN	3061. TVELO	3062. TVELP	3063. TVELQ	3064. TVELR	3065. TVELS

Plant 1 (S00 Wave 2)

451.176 SUP	-.0463 (58)	-.1155 (58)	-.2801 (58)	-.2358 (58)	-.2358 (58)	-.0751 (58)	.2292 (57)	-.2094 (57)	.0265 (57)	.0340 (57)	.2942 (57)	.0213 (57)	.0632
453.178 SUP	-.1833 (57)	.0068 (57)	-.3827 (57)	-.2176 (57)	-.2176 (57)	.0001 (57)	.1911 (56)	-.0989 (56)	.1300 (56)	.0449 (56)	.2096 (56)	.1086 (56)	-.0759 (56)
455.180 SUP	-.0911 (58)	-.1606 (58)	-.2915 (58)	-.2764 (58)	-.2764 (58)	-.0984 (58)	.2853 (57)	-.0781 (57)	.0257 (57)	-.0746 (57)	.2032 (57)	-.1445 (57)	-.0243 (57)
457.182 SUP	-.1075 (58)	-.0534 (58)	-.3001 (58)	-.2584 (58)	-.2584 (58)	-.1049 (58)	.1093 (57)	-.1375 (57)	.0217 (57)	.0173 (57)	.2509 (57)	.0175 (57)	-.0656 (57)
459.184 PEER	-.1239 (57)	-.2223 (57)	-.3129 (57)	-.3818 (57)	-.3818 (57)	-.0329 (57)	.1354 (56)	-.2245 (56)	.0784 (56)	-.0460 (56)	.2713 (56)	-.0826 (56)	-.0659 (56)
461.186 PEER	-.0948 (58)	-.2329 (58)	-.3437 (58)	-.3828 (58)	-.3828 (58)	-.0691 (58)	.2164 (57)	-.2147 (57)	.0551 (57)	-.0720 (57)	.2767 (57)	-.0539 (57)	-.0763 (57)
463.188 PEER	.0225 (58)	-.2540 (58)	-.2628 (58)	-.3666 (58)	-.3666 (58)	-.1503 (58)	.1819 (57)	-.1404 (57)	-.0085 (57)	.0652 (57)	.2297 (57)	-.0062 (57)	-.1094 (57)
465.190 PEER	-.0424 (58)	-.1718 (58)	-.3539 (58)	-.3231 (58)	-.3231 (58)	-.0937 (58)	.1401 (57)	-.2039 (57)	-.0056 (57)	.0750 (57)	.2779 (57)	.0767 (57)	-.1310 (57)
468.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
471.196 HUM.	-.2400 (58)	-.2454 (58)	-.2107 (58)	-.1289 (58)	-.1289 (58)	.0210 (58)	.3581 (57)	.0355 (57)	.2682 (57)	-.1564 (57)	.3745 (57)	-.1886 (57)	-.0561 (57)
472.197 COMM	-.0690 (58)	-.2841 (58)	-.2496 (58)	-.2581 (58)	-.2581 (58)	-.0333 (58)	.3473 (57)	.0092 (57)	.1934 (57)	-.1850 (57)	.3307 (57)	-.2395 (57)	-.0709 (57)
473.198 MOTI	-.0818 (58)	-.3196 (58)	-.2342 (58)	-.2274 (58)	-.2274 (58)	.0072 (58)	.3422 (57)	-.0201 (57)	.1861 (57)	-.1904 (57)	.2770 (57)	-.2491 (57)	-.1060 (57)
474.199 DEC.	-.1591 (57)	-.2991 (57)	-.1609 (57)	-.2404 (57)	-.2404 (57)	-.0735 (57)	.3078 (56)	-.0104 (56)	.1659 (56)	-.1680 (56)	.4170 (56)	-.2453 (56)	-.0893 (56)
475.200 SATI	-.1629 (58)	-.2594 (58)	-.2816 (58)	-.1634 (58)	-.1634 (58)	.0546 (58)	.3474 (57)	-.0808 (57)	.1595 (57)	-.1253 (57)	.2943 (57)	-.1472 (57)	-.1651 (57)
476.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
479.204 LOWE	-.0578 (58)	-.2331 (58)	-.2646 (58)	-.2456 (58)	-.2456 (58)	-.0415 (58)	.3147 (57)	-.0074 (57)	.1523 (57)	-.0755 (57)	.2073 (57)	-.1552 (57)	-.1136 (57)
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	3010. TVE1J	3011. TVE1K	3012. TVE1L	3013. TVE1M

Plant 1 (SOO Wave 2)

451.176 SUP	.0148 (57)	.0962 (57)	-.1494 (53)	-.1653 (53)	-.0540 (47)	-.0990 (53)
453.178 SUP	-.1508 (56)	.1405 (56)	-.0858 (52)	-.0467 (52)	.0237 (47)	-.0329 (52)
455.180 SUP	.1094 (57)	.0791 (57)	-.0127 (53)	-.0982 (53)	.0428 (47)	-.1241 (53)
457.182 SUP	-.0339 (57)	.1499 (57)	-.0542 (53)	-.0194 (53)	.0630 (47)	-.0314 (53)
459.184 PEER	-.0455 (56)	.0020 (56)	-.2315 (52)	-.2129 (52)	-.1096 (47)	-.1321 (52)
461.186 PEER	-.0018 (57)	.0158 (57)	-.1862 (53)	-.1578 (53)	.0254 (47)	-.1422 (53)
463.188 PEER	.0152 (57)	.1635 (57)	-.1033 (53)	.1034 (53)	.0459 (47)	-.1189 (53)
465.190 PEER	-.0617 (57)	.1630 (57)	-.1138 (53)	.0077 (53)	.0795 (47)	-.0616 (53)
468.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.
471.196 HUM.	.1261 (57)	-.0596 (57)	-.1642 (53)	-.3193 (53)	-.0643 (47)	-.0180 (53)
472.197 COMM	.1559 (57)	-.0684 (57)	-.1601 (53)	-.3118 (53)	-.0775 (47)	-.1015 (53)
473.198 MOTI	.1722 (57)	-.0777 (57)	-.1577 (53)	-.2096 (53)	-.1250 (47)	-.1786 (53)
474.199 DEC.	.1935 (56)	-.0537 (56)	-.1650 (52)	-.3093 (52)	-.0203 (47)	.0086 (52)
475.200 SATI	.0239 (57)	-.0232 (57)	-.1716 (53)	-.2427 (53)	-.1323 (47)	-.1976 (53)
476.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.
479.204 LOWE	.1194 (57)	.0041 (57)	-.0997 (53)	-.2299 (53)	.1064 (47)	.0604 (53)
	3060. TVEIN	3061. TVEIO	3062. TVEIP	3063. TVEIQ	3064. TVEIR	3065. TVEIS

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131.176 SUP	.2842 (37)	.2961 (37)	.0798 (37)	.5117** (37)	.5117** (37)	-0.	-0.	-0.	-.4807** (37)	-0.	-0.	-0.	-.2730 (31)
133.179 SUP	-.0457 (37)	.3879* (37)	-.0340 (37)	.5177** (37)	.5177** (37)	-0.	-0.	-0.	-.4927** (37)	-0.	-0.	-0.	-.4815** (31)
135.180 SUP	.0936 (37)	.4227** (37)	-.2444 (37)	.5500** (37)	.5500** (37)	-0.	-0.	-0.	-.5632** (37)	-0.	-0.	-0.	-.4624** (31)
137.182 SUP	.0910 (37)	.3943* (37)	-.1056 (37)	.5839** (37)	.5839** (37)	-0.	-0.	-0.	-.4898** (37)	-0.	-0.	-0.	-.3958* (31)
139.184 PEER	.1933 (37)	.2523 (37)	.0545 (37)	.4689** (37)	.4689** (37)	-0.	-0.	-0.	-.4724** (37)	-0.	-0.	-0.	-.3504* (31)
141.186 PEER	-.0652 (37)	.3481* (37)	-.0799 (37)	.3921* (37)	.3921* (37)	-0.	-0.	-0.	-.4947** (37)	-0.	-0.	-0.	-.4673** (31)
143.188 PEER	-.0304 (37)	.3865* (37)	-.2911 (37)	.4279** (37)	.4279** (37)	-0.	-0.	-0.	-.5133** (37)	-0.	-0.	-0.	-.5425** (31)
145.190 PEER	.0289 (37)	.3441* (37)	-.2105 (37)	.5215** (37)	.5215** (37)	-0.	-0.	-0.	-.5482** (37)	-0.	-0.	-0.	-.4800** (31)
148.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
151.196 HUM.	-.0031 (37)	.1003 (37)	.0845 (37)	.3078 (37)	.3078 (37)	-0.	-0.	-0.	-.4748** (37)	-0.	-0.	-0.	-.2268 (31)
152.197 COMM	-.0305 (37)	.2958 (37)	-.0651 (37)	.4294** (37)	.4294** (37)	-0.	-0.	-0.	-.5617** (37)	-0.	-0.	-0.	-.3465* (31)
153.198 MOTI	-.1173 (37)	.3033 (37)	-.0072 (37)	.4007* (37)	.4007* (37)	-0.	-0.	-0.	-.5795** (37)	-0.	-0.	-0.	-.3997* (31)
154.199 DEC.	-.1018 (37)	.1720 (37)	.0801 (37)	.2704 (37)	.2704 (37)	-0.	-0.	-0.	-.4115** (37)	-0.	-0.	-0.	-.2482 (31)
155.200 SATI	.1796 (37)	.2760 (37)	.0577 (37)	.5647** (37)	.5647** (37)	-0.	-0.	-0.	-.5214** (37)	-0.	-0.	-0.	-.2783 (31)
156.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
159.204 LOWE	-.1623 (37)	-.0181 (37)	.0807 (37)	.0440 (37)	.0440 (37)	-0.	-0.	-0.	-.2709 (37)	-0.	-0.	-0.	-.1136 (31)
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	3010. TVE1J	3011. TVE1K	3012. TVE1L	3013. TVE1M

Plant 2 (S00 Wave 1)

131.176 SUP	-.0980 (31)	-.4026* (31)	.0710 (30)	.4345* (29)	-.0305 (30)	.4599** (30)	-.1449 (37)	-.1449 (37)	-.2764 (37)
133.178 SUP	-.1654 (31)	-.4515** (31)	.2407 (30)	.3966* (29)	-.1962 (30)	.3823* (30)	.0796 (37)	.0796 (37)	-.1667 (37)
135.180 SUP	-.1901 (31)	-.4851** (31)	.0345 (30)	.4468* (29)	-.2513 (30)	.3968* (30)	.0699 (37)	.0699 (37)	-.1645 (37)
137.182 SUP	-.1590 (31)	-.4021* (31)	.2247 (30)	.4917** (29)	-.1914 (30)	.4291* (30)	-.0616 (37)	-.0616 (37)	-.2066 (37)
139.184 PEER	.1224 (31)	-.4081* (31)	.2230 (30)	.3621* (29)	-.0984 (30)	.4966* (30)	-.2737 (37)	-.2737 (37)	-.3014 (37)
141.186 PEER	-.0851 (31)	-.5374** (31)	-.0190 (30)	.5074** (29)	-.0192 (30)	.5701** (30)	-.0764 (37)	-.0764 (37)	-.2901 (37)
143.188 PEER	-.0569 (31)	-.5293** (31)	-.0180 (30)	.4033* (29)	-.1857 (30)	.4017* (30)	-.0059 (37)	-.0059 (37)	-.2493 (37)
145.190 PEER	-.0297 (31)	-.5231** (31)	.0538 (30)	.5703** (29)	-.1003 (30)	.5592** (30)	-.0676 (37)	-.0676 (37)	-.2689 (37)
148.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
151.196 HUM.	.2216 (31)	-.4012* (31)	-.1962 (30)	.6316** (29)	.2664 (30)	.6670** (30)	-.1602 (37)	-.1602 (37)	-.3400* (37)
152.197 COMM	-.0363 (31)	-.5240** (31)	-.1238 (30)	.5174** (29)	.0686 (30)	.5953** (30)	-.0910 (37)	-.0910 (37)	-.4324** (37)
153.198 MOTI	-.0196 (31)	-.5459** (31)	-.1564 (30)	.5869** (29)	.1375 (30)	.6541** (30)	-.0303 (37)	-.0303 (37)	-.4581** (37)
154.199 DEC.	0187 (31)	-.4470** (31)	-.1566 (30)	.4697* (29)	.1997 (30)	.5977** (30)	-.1828 (37)	-.1828 (37)	-.4849** (37)
155.200 SATI	-.0420 (31)	-.3731* (31)	.1645 (30)	.6176** (29)	-.0277 (30)	.5894** (30)	-.2522 (37)	-.2522 (37)	-.2890 (37)
156.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
159.204 LOWE	-.1139 (31)	-.2993 (31)	-.3993* (30)	.5708** (29)	.2866 (30)	.4478* (30)	.0540 (37)	.0540 (37)	-.3063 (37)
	3060. TVE1N	3061. TVE1O	3062. TVE1P	3063. TVE1Q	3064. TVE1R	3065. TVE1S	3027. ABSB	3028. ABSC	3030. ABSE

451.176 SUP	.1349 (37)	.3756* (37)	.0924 (37)	.5105** (37)	.5105** (37)	C.	-0.	-0.	-.5425** (37)	-0.	-0.	-0.	-.4249* (31)
453.178 SUP	-.1339 (37)	.3702* (37)	.1121 (37)	.4772** (37)	.4772** (37)	0.	-0.	-0.	-.4827** (37)	-0.	-0.	-0.	-.3616* (31)
455.180 SUP	-.0356 (37)	.4743** (37)	-.0173 (37)	.5587** (37)	.5587** (37)	-0.	-0.	-0.	-.5515** (37)	-0.	-0.	-0.	-.4478** (31)
457.182 SUP	-.0624 (37)	.3452* (37)	-.0379 (37)	.6016** (37)	.6016** (37)	-0.	-0.	-0.	-.2568* (37)	-0.	-0.	-0.	-.0829 (31)
459.184 PEER	.1850 (37)	.0964 (37)	-.0669 (37)	.3507* (37)	.3507* (37)	-0.	-0.	-0.	-.1521 (37)	-0.	-0.	-0.	-.0768 (31)
461.186 PEER	.0762 (37)	.3870* (37)	-.0127 (37)	.5865** (37)	.5865** (37)	-0.	-0.	-0.	-.4232** (37)	0.	-0.	-0.	-.2810 (31)
463.188 PEER	-.0394 (37)	.3892* (37)	-.1094 (37)	.6288** (37)	.6288** (37)	-0.	-0.	-0.	-.3548* (37)	-0.	-0.	-0.	-.1833 (31)
465.190 PEER	-.0236 (37)	.3704* (37)	-.0473 (37)	.6098** (37)	.6098** (37)	-0.	-0.	-0.	-.3145 (37)	-0.	-0.	-0.	-.1390 (31)
468.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
471.196 HUM.	-.0495 (37)	.3179* (37)	.2463 (37)	.3975* (37)	.3975* (37)	-0.	-0.	-0.	-.4171** (37)	-0.	-0.	-0.	-.3742* (31)
472.197 COMM	-.1668 (37)	.4881** (37)	.1839 (37)	.5532** (37)	.5532** (37)	-0.	-0.	-0.	-.5205** (37)	-0.	-0.	-0.	-.4378** (31)
473.198 MOTI	-.1555 (37)	.4482** (37)	.1653 (37)	.4585** (37)	.4585** (37)	-0.	-0.	-0.	-.5238** (37)	-0.	-0.	-0.	-.4475** (31)
474.199 DEC.	-.0979 (37)	.3128 (37)	.1674 (37)	.3866* (37)	.3866* (37)	-0.	-0.	-0.	-.2806 (37)	-0.	-0.	-0.	-.2465 (31)
475.200 SATI	-.0997 (37)	.3179* (37)	.0759 (37)	.5333** (37)	.5333** (37)	-0.	-0.	-0.	-.4142** (37)	-0.	-0.	-0.	-.2924 (31)
476.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	0.
479.204 LOWE	-.1907 (37)	.2901 (37)	.2310 (37)	.3176* (37)	.3176* (37)	-0.	-0.	-0.	-.3584* (37)	-0.	-0.	-0.	-.3036 (31)
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	3010. TVE1J	3011. TVE1K	3012. TVE1L	3013. TVE1M

Plant 2 (S00 Wave 2)

451.176 SUP	-.0273 (31)	-.5123** (31)	.2621 (29)	.2892 (28)	-.2119 (29)	.4670** (29)	-.0779 (37)	-.0779 (37)	-.2313 (37)
453.178 SUP	.0180 (31)	-.4587** (31)	.1172 (29)	.4323* (28)	-.0838 (29)	.5451** (29)	.1076 (37)	.1076 (37)	-.2544 (37)
455.180 SUP	.1232 (31)	-.5276** (31)	.1661 (29)	.2885 (28)	-.2863 (29)	.4422* (29)	-.0402 (37)	-.0402 (37)	-.3718* (37)
457.182 SUP	-.0226 (31)	-.2210 (31)	.1621 (29)	.4190* (28)	-.1580 (29)	.5658** (29)	.1197 (37)	.1197 (37)	-.3042 (37)
459.184 PEER	.2767 (31)	-.1096 (31)	.0977 (29)	.3406 (28)	-.0012 (29)	.3873* (29)	-.1552 (37)	-.1552 (37)	-.1898 (37)
461.186 PEER	.0696 (31)	-.3655* (31)	.1652 (29)	.5074** (28)	-.1267 (29)	.6280** (29)	-.1136 (37)	-.1136 (37)	-.2502 (37)
463.188 PEER	.0942 (31)	-.2661 (31)	.2712 (29)	.3483 (28)	-.2662 (29)	.5277** (29)	-.0336 (37)	-.0336 (37)	-.1829 (37)
465.190 PEER	.0200 (31)	-.2114 (31)	.2356 (29)	.4380* (28)	-.1123 (29)	.5777** (29)	-.0859 (37)	-.0859 (37)	-.2060 (37)
468.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
471.196 HUM.	.1337 (31)	-.3971** (31)	.1793 (29)	.4565* (28)	.0108 (29)	.4718** (29)	-.2603 (37)	-.2603 (37)	-.4870** (37)
472.197 COMM	.0404 (31)	-.5125** (31)	.2803 (29)	.4451* (28)	-.1966 (29)	.5781** (29)	-.1215 (37)	-.1215 (37)	-.4356** (37)
473.198 MOTI	.1540 (31)	-.4922** (31)	.1258 (29)	.4921** (28)	-.0627 (29)	.5658** (29)	-.1794 (37)	-.1794 (37)	-.4046* (37)
474.199 DEC.	.0583 (31)	-.2859 (31)	.1505 (29)	.3649 (28)	-.0187 (29)	.4203* (29)	-.2109 (37)	-.2109 (37)	-.4721** (37)
475.200 SATI	-.0134 (31)	-.3300 (31)	.3437 (29)	.5083** (28)	-.0600 (29)	.5889** (29)	-.2055 (37)	-.2055 (37)	-.3880* (37)
476.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
479.204 LOWE	.0710 (31)	-.3069 (31)	.1406 (29)	.3497 (28)	.0022 (29)	.3730* (29)	-.1916 (37)	-.1916 (37)	-.3226* (37)
	3060. TVE1N	3061. TVE1O	3062. TVE1P	3063. TVE1Q	3064. TVE1R	3065. TVE1S	3027. ABSB	3028. ABSC	3030. ABSE

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131.176 SUP	-.0436 (74)	-.0523 (73)	.0447 (73)	-.0513 (73)	.0457 (74)	-.0582 (77)	-0.	-0.	-.0125 (74)	.0881 (74)	-0.	-0.	-.0359 (73)
133.178 SUP	-.1148 (74)	-.1004 (73)	.1763 (73)	-.1026 (73)	.1889 (74)	-.0977 (77)	-0.	-0.	-.1493 (74)	.0139 (74)	-0.	-0.	-.0953 (73)
135.180 SUP	-.1459 (74)	-.1585 (73)	.1431 (73)	-.1619 (73)	.2215 (74)	-.1526 (77)	-0.	-0.	.0010 (74)	.0710 (74)	-0.	-0.	-.1012 (73)
137.182 SUP	-.1817 (73)	-.1792 (73)	-.0507 (73)	-.1798 (73)	.0837 (73)	-.1851 (77)	-0.	-0.	.0969 (73)	.0492 (73)	-0.	-0.	-.0977 (72)
139.184 PEER	-.0257 (73)	-.0272 (73)	-.1365 (73)	-.0220 (73)	-.0088 (73)	-.0403 (77)	-0.	-0.	.2530* (73)	.1630 (73)	-0.	-0.	.1877 (72)
141.186 PEER	-.1636 (73)	-.1534 (73)	-.1287 (73)	-.1555 (73)	.0689 (73)	-.1646 (77)	-0.	-0.	.0665 (73)	.0031 (73)	-0.	-0.	.0133 (72)
143.188 PEER	-.2107 (73)	-.2066 (73)	-.0918 (73)	-.2070 (73)	.1532 (73)	-.2127 (77)	-0.	-0.	.0810 (73)	.0330 (73)	-0.	-0.	.0308 (72)
145.190 PEER	-.1053 (73)	-.1053 (73)	-.1800 (73)	-.1033 (73)	.0149 (73)	-.1181 (77)	-0.	-0.	.1492 (73)	.0916 (73)	-0.	-0.	.0486 (72)
148.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
151.196 HUM.	-.1363 (74)	-.1128 (73)	-.0682 (73)	-.1185 (73)	.0702 (74)	-.1343 (77)	-0.	-0.	.1318 (74)	.2467* (74)	-0.	-0.	.0335 (73)
152.197 COMM	-.1445 (74)	-.1350 (73)	-.0952 (73)	-.1365 (73)	.0337 (74)	-.1513 (77)	-0.	-0.	.0308 (74)	.1525 (74)	-0.	-0.	-.0307 (73)
153.198 MOTI	-.2234* (74)	-.2098 (73)	.0335 (73)	-.2152 (73)	.2274* (74)	-.2229* (77)	-0.	-0.	.1051 (74)	.1721 (74)	-0.	-0.	.0479 (73)
154.199 DEC.	-.1358 (74)	-.1263 (73)	.0104 (73)	-.1289 (73)	.1233 (74)	-.1437 (77)	-0.	-0.	.1645 (74)	.2065 (74)	-0.	-0.	.1486 (73)
155.200 SATI	-.0155 (73)	.0003 (73)	-.0573 (73)	-.0040 (73)	-.0448 (73)	-.0189 (77)	-0.	-0.	.0563 (73)	.2081 (73)	-0.	-0.	.0226 (72)
156.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
159.204 LOWE	-.1428 (74)	-.1162 (73)	.0048 (73)	-.1187 (73)	.1084 (74)	-.1279 (77)	-0.	-0.	.0558 (74)	.2411 (74)	-0.	-0.	-.1486 (73)
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	3010. TVE1J	3011. TVE1K	3012. TVE1L	3013. TVE1M

131.176 SUP	-0.	-0.	-0.	-0.	-.0143 (71)	-.0603 (66)	-.1964 (78)	-.1964 (78)	-.1874 (78)
133.178 SUP	-0.	-0.	-0.	-0.	.1103 (71)	-.0925 (66)	-.1649 (78)	-.1649 (78)	-.2240* (78)
135.180 SUP	-0.	-0.	-0.	-0.	.0859 (71)	-.1450 (66)	-.2723* (78)	-.2723* (78)	-.2756* (78)
137.182 SUP	-0.	-0.	-0.	-0.	-.0056 (70)	-.0665 (65)	-.2612* (77)	-.2612* (77)	-.2061 (77)
139.184 PEER	-0.	-0.	-0.	-0.	.1222 (70)	.1724 (65)	-.1172 (77)	-.1172 (77)	.0578 (77)
141.186 PEER	-0.	-0.	-0.	-0.	.1873 (70)	.0816 (65)	-.2378* (77)	-.2378* (77)	-.2124 (77)
143.188 PEER	-0.	-0.	-0.	-0.	.0437 (70)	.0803 (65)	-.2778* (77)	-.2778* (77)	-.2035 (77)
145.190 PEER	-0.	-0.	-0.	-0.	.0595 (70)	.1123 (65)	-.2422* (77)	-.2422* (77)	-.1047 (77)
148.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
151.196 HUM.	-0.	-0.	-0.	-0.	.3948 (71)	.1008 (66)	-.1026 (78)	-.1026 (78)	-.0393 (78)
152.197 COMM	-0.	-0.	-0.	-0.	.1526 (71)	.0260 (66)	-.0779 (78)	-.0779 (78)	.1513 (78)
153.198 MOTI	-0.	-0.	-0.	-0.	.3801 (71)	.0553 (66)	-.0555 (78)	-.0555 (78)	-.0593 (78)
154.199 DEC.	-0.	-0.	-0.	-0.	.2395* (71)	.1726 (66)	-.1033 (78)	-.1033 (78)	-.0325 (78)
155.200 SATI	-0.	-0.	-0.	-0.	.2839* (70)	.1207 (65)	-.0947 (77)	-.0947 (77)	-.1040 (77)
156.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
159.204 LOWE	-0.	-0.	-0.	-0.	.0848 (71)	-.0773 (66)	-.1211 (78)	-.1211 (78)	-.1022 (78)
	3060. TVE1N	3061. TVE1O	3062. TVE1P	3063. TVE1Q	3064. TVE1R	3065. TVE1S	ABSB	ABSC	ABSE

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451.176 SUP	-.1324 (75)	-.0994 (74)	-.0347 (74)	-.0965 (74)	.0242 (75)	-.1062 (78)	-0.	-0.	.0401 (74)	.1102 (74)	-0.	-0.	-.2573 (73)	
453.178 SUP	-.1130 (75)	-.1056 (74)	-.0609 (74)	-.1026 (74)	.0595 (75)	-.1150 (78)	-0.	-0.	.1233 (74)	.0629 (74)	-0.	-0.	-.2544 (73)	
455.180 SUP	-.0633 (74)	-.0562 (73)	-.0707 (73)	-.0536 (73)	.0221 (74)	-.0647 (77)	-0.	-0.	.1126 (73)	.0519 (73)	-0.	-0.	-.2835 (72)	
457.182 SUP	-.1979 (74)	-.1927 (73)	-.0720 (73)	-.1899 (73)	.0980 (74)	-.1956 (77)	-0.	-0.	.1280 (73)	.0388 (73)	-0.	-0.	-.2122 (72)	
459.184 PEER	-.0048 (75)	.0165 (74)	-.1244 (74)	.0173 (74)	-.0703 (75)	-.0024 (78)	-0.	-0.	.1118 (74)	.1516 (74)	-0.	-0.	-.2729 (73)	
461.186 PEER	-.2642 (75)	-.2421 (74)	-.0348 (74)	-.2438 (74)	.2162 (75)	-.2410 (78)	-0.	-0.	.2128 (74)	.1303 (74)	-0.	-0.	-.2316 (73)	
463.189 PEER	-.1044 (75)	-.0755 (74)	.0314 (74)	-.0780 (74)	.1120 (75)	-.0894 (78)	-0.	-0.	.2193 (74)	.1478 (74)	-0.	-0.	-.2614 (73)	
465.190 PEER	-.2034 (75)	-.1858 (74)	-.0266 (74)	-.1861 (74)	.1370 (75)	-.1888 (78)	-0.	-0.	.2522 (74)	.1345 (74)	-0.	-0.	-.1388 (73)	
468.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	0.	
471.195 HUM.	.0090 (75)	.0324 (74)	-.1397 (74)	.0327 (74)	-.0019 (75)	.0093 (78)	-0.	-0.	.1381 (74)	.1843 (74)	-0.	-0.	-.0519	
472.197 COMM	-.0848 (75)	-.0621 (74)	-.1175 (74)	-.0609 (74)	.0563 (75)	-.0805 (78)	-0.	-0.	.1486 (74)	.0849 (74)	-0.	-0.	-.1345 (73)	
473.198 MOTI	.0214 (75)	.0447 (74)	-.1284 (74)	.0444 (74)	-.0078 (75)	.0221 (78)	-0.	-0.	.0237 (74)	.1191 (74)	-0.	-0.	-.1355 (73)	
474.199 DEC.	.0261 (75)	.0527 (74)	-.1052 (74)	.0520 (74)	.0229 (75)	.0242 (78)	-0.	-0.	.2012 (74)	.2048 (74)	-0.	-0.	-.1023 (73)	
475.200 SATI	-.0412 (75)	-.0180 (74)	-.0983 (74)	-.0179 (74)	.0017 (75)	-.0371 (78)	-0.	-0.	.1527 (74)	.1540 (74)	-0.	-0.	-.1025 (73)	
476.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	0.	
479.204 LOWE	-.0618 (75)	-.0305 (74)	-.1019 (74)	-.0331 (74)	.1205 (75)	-.0537 (78)	-0.	-0.	.1571 (74)	.2218 (74)	-0.	-0.	-.1031 (73)	
	3001. TVE1A	3002. TVE1B	3003. TVE1C	3004. TVE1D	3005. TVE1E	3006. TVE1F	3007. TVE1G	3008. TVE1H	3009. TVE1I	301C. TVE1J	3011. TVE1K	3012. TVE1L	3013. TVE1M	

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451.176 SUP	-0.	-0.	-0.	-0.	-.1548 (71)	-.2855* (69)	-.1011 (79)	-.1011 (79)	-.0820 (79)
453.178 SUP	-0.	-0.	-0.	-0.	-.0202 (71)	-.2414* (69)	-.0683 (79)	-.0683 (79)	-.0497 (79)
455.180 SUP	-0.	-0.	-0.	-0.	-.0047 (70)	-.2983* (68)	-.1659 (78)	-.1659 (78)	-.1200 (78)
457.182 SUP	-0.	-0.	-0.	-0.	-.0621 (70)	-.2487* (68)	-.1728 (78)	-.1728 (78)	-.1224 (78)
459.184 PEER	-0.	-0.	-0.	-0.	-.0486 (71)	-.2675* (69)	-.0707 (79)	-.0707 (79)	-.0006 (79)
461.186 PEER	-0.	-0.	-0.	-0.	.1383 (71)	-.2031 (69)	-.1664 (79)	-.1664 (79)	.0297 (79)
463.188 PEER	-0.	-0.	-0.	-0.	.1143 (71)	-.2396* (69)	-.2346* (79)	-.2346* (79)	.0153 (79)
465.190 PEER	-0.	-0.	-0.	-0.	.0726 (71)	-.1233 (69)	-.2070 (79)	-.2070 (79)	.0078 (79)
468.193 TECH	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
471.196 HUM	-0.	-0.	-0.	-0.	.2510* (71)	-.1395 (69)	-.2075 (79)	-.2075 (79)	-.0825 (79)
472.197 COMM	-0.	-0.	-0.	-0.	.1681 (71)	-.1858 (69)	-.1397 (79)	-.1397 (79)	-.0814 (79)
473.198 MOTI	-0.	-0.	-0.	-0.	.2834* (71)	-.2054 (69)	-.2314* (79)	-.2314* (79)	-.1936 (79)
474.199	-0.	-0.	-0.	-0.	.1683 (71)	-.1514 (69)	-.2417* (79)	-.2417* (79)	-.1153 (79)
475.200	-0.	-0.	-0.	-0.	.1357 (71)	-.1534 (69)	-.1612 (79)	-.1612 (79)	-.0710 (79)
476.201 GROU	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
479.204 LOWE	-0.	-0.	-0.	-0.	.3497** (71)	-.1459 (69)	-.1036 (79)	-.1036 (79)	-.0716 (79)
	3060. TVE1N	3061. TVE1O	3062. TVE1P	3063. TVE1Q	3064. TVE1R	3065. TVE1S	3027. ABSB	3028. ABSC	3030. ABSE

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